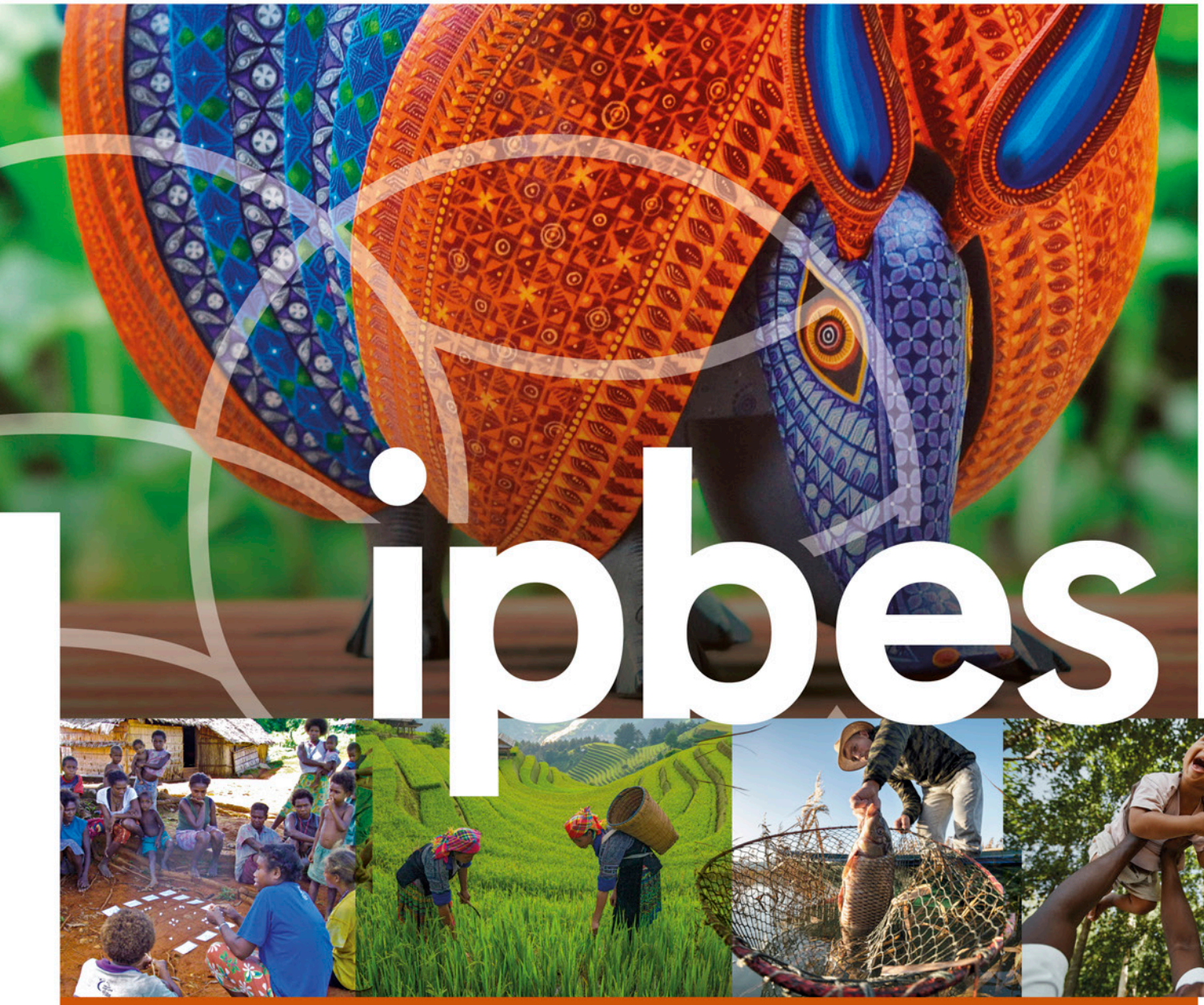

The methodological assessment report on

THE DIVERSE VALUES AND VALUATION OF NATURE

ipbes

THE IPBES METHODOLOGICAL ASSESSMENT REPORT ON THE DIVERSE VALUES AND VALUATION OF NATURE

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For further information, please contact

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)
IPBES Secretariat, UN Campus
Platz der Vereinten Nationen 1, D-53113 Bonn, Germany
Phone: +49 (0) 228 815 0570
Email: secretariat@ipbes.net
Website: www.ipbes.net

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Technical support unit

David González-Jiménez (Head)
Mariana Cantú-Fernández
Gabriela Arroyo-Robles
Victoria Contreras
Louise Guibrunet

Graphic Design

Maro Haas, Art direction, figures and layout
Yuka Estrada, Figures of the summary for policymakers
David González-Jiménez, Chapter Figures
Mariana Cantú-Fernández, Maps
Delphine Chéret-Dogbo, Figures

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MEMBERS OF THE MANAGEMENT COMMITTEE WHO PROVIDED GUIDANCE FOR THE PRODUCTION OF THIS ASSESSMENT

Bibiana Vilá, Antonio Díaz-de-León, Chimere Diaw, Mersudin Avdibegovic, Julia Marton-Lefevre, Rashad Allahverdiyev.

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The methodological assessment report on

THE DIVERSE VALUES AND VALUATION OF NATURE

Edited by:

Patricia Balvanera
Institute for Ecosystems and Sustainability Research at the National Autonomous University of Mexico, Morelia, Mexico
Assessment Co-Chair

Unai Pascual
BasqueCentre for Climate Change (BC3) in Bilbao, Spain, and
Centre for Development and Environment, University of Bern, Switzerland
Assessment Co-Chair

Michael Christie
Aberystwyth University, Wales, UK
Assessment Co-Chair

Brigitte Baptiste
EAN University, Bogota, Colombia
Assessment Co-Chair

David González- Jiménez
IPBES Secretariat, Morelia, México
Head, Technical Support Unit

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IPBES is an independent intergovernmental body comprising about 140 member Governments. Established by Governments in 2012, IPBES provides policymakers with objective scientific assessments about the state of knowledge regarding the planet's biodiversity, ecosystems and the contributions they make to people, as well as options and actions to protect and sustainably use these vital natural assets.

The Assessment of the Diverse Values and Valuation of Nature was initiated by a decision from the IPBES Plenary at its sixth session (IPBES 6, Medellin, Colombia, 2018), based on the scoping report approved by the Plenary at its fourth session (IPBES 4, Kuala Lumpur, Malaysia, 2016). It was considered by the IPBES Plenary at its nintht session (IPBES 9, Bonn, Germany, 2022), which approved its summary for policymakers, and accepted its chapters. All material can be found here: https://ipbes.net/the-values-assessment

FOREWORD

A key objective of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is to provide Governments, the private sector and civil society with scientifically credible and independent up-to-date assessments of available knowledge for better evidence-informed policy decisions and action at the local, national, regional and global levels.

The Assessment of the Diverse Values and Valuation of Nature, or "Values Assessment" in short, is part of a series of reports whose production was initiated during the "first work programme of IPBES, 2014-2018" and concluded during the current "IPBES rolling work programme up to 2030". The Values Assessment has been carried out by close to 100 selected experts from all regions of the world, including early career fellows, assisted by about 200 contributing authors. More than 13,000 scientific publications were analyzed as well as a substantive body of indigenous and local knowledge. Its chapters were accepted, and its summary for policymakers was approved, by the IPBES Plenary composed of 139 member States at its ninth session held from 3rd to 9th July 2022 in Bonn, Germany.

The Values Assessment builds on the landmark IPBES Global Assessment Report on Biodiversity and Ecosystem services launched in 2019. The Global Assessment identified the role of economic growth as a key driver of nature loss, with 1 million species of plants and animals now at risk of extinction and concluded that the deterioration of nature and loss of biodiversity are underpinned by societal values and behaviours.

The Values Assessment explores how people across many different regions and social contexts have conceptualised human-nature relationships and proposes a novel and comprehensive typology of nature's values. The typology highlights how different worldviews and knowledge systems influence the ways people interact with and value nature.

The Assessment then studies the different methods to value nature, explores whether and how these valuations methods have been used in thousands of decisions affecting nature, and whose views have been considered or ignored. The Assessment finally focuses on transformative change and on how to concretely consider the multiple values of nature in decision making to build more sustainable and just futures.

The Values Assessment shows how economic and political decisions have predominantly prioritised certain values of nature, particularly market-based instrumental values of nature, which do not adequately reflect how changes in nature affect people's quality of life, at the expense of many non-market values associated with nature's contributions to people, such as climate regulation and cultural identity. The Assessment demonstrates that recognizing and respecting the worldviews, values and traditional knowledge of indigenous peoples and local communities lead to the formulation of policies that are more inclusive, with better outcomes for people and nature.

As the Chair and the Executive Secretary of IPBES, we wish to recognize the leadership and dedication of the co-chairs, Prof. Unai Pascual (Spain/Switzerland), Prof. Patricia Balvanera (Mexico), Prof. Mike Christie (United Kingdom) and Dr. Brigitte Baptiste (Colombia) and the hard work and commitment of all the coordinating lead authors, lead authors, review editors, fellows, contributing authors and external reviewers, and to warmly thank them for contributing their time and ideas freely to this important report. We would also like to recognize the leadership and dedication of David González-Jiménez, head of the technical support unit for this Assessment, and the hard work of the other members of the unit including Mariana Cantú, Gabriela Arroyo, Victoria Contreras, Louise Guibrunet and Fernanda Rios.

Our thanks go also to the current and former members of the Multidisciplinary Expert Panel (MEP) and of the Bureau who provided guidance as part of the management committee for this report, and to members of the IPBES secretariat including those of other technical support units within the IPBES secretariat, who have supported the production of this report, and its successful launch in the media. We would also like to thank all Governments and other institutions that provided financial and in-kind support for the preparation of this Assessment.

We are profoundly aware that work was made more challenging over the past couple of years because of the COVID-19 pandemic which prevented the experts from meeting and connecting in-person as planned, and which created very difficult personal circumstances for many. We express again our deepest thanks and recognition to all involved, on behalf of IPBES.

The Values Assessment is expected to trigger an awareness of the diverse values which lie at the root of the deterioration of nature, and to help shape new decisions which are better informed by a plurality of values from a diversity of stakeholders, toward more just and sustainable futures. It is our sincere hope that this Assessment will form a significant contribution to the implementation of the new Global Biodiversity Framework of the Convention on Biological Diversity.

Ana María Hernández Salgar
Chair of IPBES

Anne Larigauderie
Executive Secretary of IPBES

STATEMENTS FROM KEY PARTNERS

Nature is what sustains us all. It gives us food, medicine, raw materials, oxygen, climate regulation and so much more. Nature, in all its diversity, is the greatest asset that humanity could ever ask for. Yet its true value is often left out of decision making. Nature's life support system has become an externality that doesn't even make it onto the ledger sheet. And so, it is lost in the pursuit of short-term profit.

If we do not value nature and account for it in decision-making, it will continue to be lost. And that can only be bad news for humanity. Valuing nature is central to the success of the post-2020 Global Biodiversity Framework which is currently being negotiated by Member States.

It is for this reason that the Values Assessment report by IPBES, whose secretariat is hosted by UNEP, is so crucial. This report makes it clear that we must place science-based valuation of nature at the heart of economic decision making.

The UN has adopted the System of Environmental and Economic Accounting as the standard for countries' national accounts. We must ensure that it is implemented around the world – to finally value nature for its incredible contribution and so protect it.

Inger Andersen
Under-Secretary-General of the United Nations and Executive Director,
United Nations Environment Programme (UNEP)

The diversity of cultural expressions is an extraordinary opportunity to understand how biodiversity is perceived across the globe, learn from each other and to imagine solutions. This IPBES assessment report on values is an important step towards this goal, to understand and change the way we relate to nature. Making peace with nature is a matter of behavioral change, ethics and values. Reconciliation is already happening in UNESCO sites across the globe, and these new relationships can be shared with the world. For this, we believe in the power of social and human sciences and education.

Audrey Azoulay
Director-General,
United Nations Educational, Scientific and Cultural Organization (UNESCO)

Resilient and productive ecosystems are the foundation of sustainable agrifood systems. A better understanding of nature's multiple values and benefits is essential for proper decisions affecting the use and conservation of our natural resources. Policymakers need to weigh how their decisions will affect different components of biodiversity and different segments of society across the world and over time. This IPBES assessment report offers a wide range of options, perspectives and approaches to help integrate nature's diverse values into policy.

The IPBES report findings will bolster efforts to achieve the Sustainable Development Goals, to address the impacts of the climate crisis, biodiversity loss and ecosystem degradation, and to open potential holistic pathways for better production, better nutrition, a better environment, and a better life for all, leaving no one behind.

Dr QU Dongyu
Director-General,
Food and Agriculture Organization of the United Nations (FAO)

The IPBES, the world's premier mechanism for evidence-based policy dialogue on the relationship between people and nature, is launching its *Assessment Report on the Diverse Conceptualization of the Multiple Values of Nature and its Benefits*. The report highlights a major gap between science and policy, with less than 5% of valuation studies finding their way into policy. As the post-2020 Global Biodiversity Framework is finalised, the Values Assessment is helping to close this longstanding gap by supporting decision-makers to choose and design appropriate valuation methods for nature. It also provides a much-needed roadmap for countries to operationalize their biodiversity commitments and the nature-dependent Sustainable Development Goals.

Achim Steiner
Administrator,
United Nations Development Programme (UNDP)

The forthcoming IPBES Assessment Report on the Values and Valuation of Nature is timely. This "Values Assessment" will help us better understand the different ways that people interact with and benefit from nature, and also help us grasp the way we can measure these.
Under the Convention, this nuanced understanding of values will provide a strong basis for better policy design at the national level, including mainstreaming, national planning, and economic policy, within the broader context of national policies for sustainable development. This year at COP 15, governments are expected to adopt a global biodiversity framework that will allow the world to bend the curve on biodiversity loss and set us on a path of living in harmony with nature. Implementing the goals and targets in this global biodiversity framework, which will complement 2030 Sustainable Development Agenda, absolutely is underpinned by knowledge of the different types of values of nature as demonstrated in the IPBES Values Assessment.
I applaud the work of all IPBES experts for this and look forward to its active use by all Parties and Stakeholders to the Convention.

Elizabeth Maruma Mrema
Executive Secretary,
Convention on Biological Diversity (CBD)

We are indebted to the hundreds of experts, policymakers, and practitioners, as well as members of Indigenous Peoples and Local Communities, who generously contributed their time and knowledge, as authors, fellows, review editors (all of them listed below), and to all contributing authors of this Assessment, as well as to the management committee who oversaw the development of this Assessment. The outcomes of this product reflect hundreds of hours of collective effort to provide the best available knowledge on values and valuation to support more just and sustainable futures.

We are grateful to all the members of the IPBES secretariat, particularly the Executive Secretary, Anne Larigauderie, to the IPBES Chair, Ana María Hernández Salgar, to representatives of member States, and to the Multidisciplinary Expert Panel and Bureau for their continued advice, dedication, and constructive inputs towards the production of this report, especially under the challenging conditions posed by the COVID-19 pandemic. The Assessment of the Diverse Values and Valuation of Nature would not have been possible without the titanic effort and effective guidance of its technical support unit headed by David González-Jiménez and supported by Mariana Cantú, Gabriela Arroyo, Victoria Contreras, Louise Guibrunet and Fernanda Rios during the four years of its production. We thank Ana Belluscio for her editorial support to improve the communication of complex ideas in the summary for policymakers. We also thank Robert T. Watson for reviewing and providing valuable feedback on the summary for policymakers. We extend our sincere thanks to all the IPBES technical support units, and their host institutions who provided support to the values assessment at different stages of the process: the technical support unit on knowledge and data (Senckenberg Society for Natural Research, Germany and Foundation for Research on Biodiversity, France), the technical support unit on indigenous and local knowledge (UNESCO), the technical support unit on capacity building (Norwegian Environment Agency, Norway), the technical support unit on policy support tools (UNEP-World Conservation Monitoring Centre), the technical support unit on scenarios and models (Netherlands Environmental Assessment Agency, Netherlands). We thank Yuka Estrada and Maro Haas for their skilful and experienced work on data visualisation and graphic design. We thank the IPBES communications team for their outstanding work to ensure the widest outreach of the main findings of this Assessment.

ACKNOWLEDGEMENTS

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We would lastly like to thank all our friends and relatives, and those of all the experts, who supported us during the COVID pandemics. This work would not have been possible without their love and endless support.

The dedication and contributions of all those mentioned above made the Assessment of the Diverse Values and Valuation of Nature a scientifically robust, unique and rich document, and we are confident that it will be impactful and contribute to an increased consideration of the many values of nature in decision making. For that we extend again our deepest gratitude to all.

Patricia Balvanera, Unai Pascual,
Michael Christie, Brigitte Baptiste
Co-Chairs

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The coordinating lead authors, lead authors and fellows:

Christopher B. Anderson, Simone Athayde, David N. Barton, Becky Chaplin-Kramer, Sander Jacobs, Eszter Kelemen, Ritesh Kumar, Elena Lazos Chavero, Adrian Martin, Tuyeni H. Mwampamba, Barbara Nakangu, Patrick O'Farrell, Christopher M. Raymond, Suneetha M. Subramanian, Mette Termansen, Meine van Noordwijk, Arild Vatn, SoEun Ahn, Paola Arias-Arévalo, Antonio J. Castro Martínez, Andy Choi, Alta De Vos, Nicolas Dendoncker, Stefanie Engel, Uta Eser, Daniel P. Faith, Houda Ghazi, Alexander Girvan, Erik Gomez-Baggethun, Rachelle K. Gould, Haripriya Gundimeda, Thomas Hahn, Zuzana Harmáčková, Andra-Ioana Horcea-Milcu, Mariaelena Huambachano, Mine Islar, Jasper Kenter, Marina Kosmus, Heera Lee, Beria Leimona, Sharachchandra Lele, Juliana Merçon, Nibedita Mukherjee, Barbara Muraca, Roldan Muradian, Gabriel Ricardo Nemogá, Jonas Ngouhouo-Poufoun, Aidin Niamir, Emmanuel Nuesiri, Tobias Ochieng Nyumba, Begüm Özkaynak, Ignacio Palomo, Ram Pandit, Agnieszka Pawlowska-Mainville, Luciana Porter-Bolland, Martin Quaas, Julian Rode, Ricardo Rozzi, Sonya Sachdeva, Aibek Samakov, Marije Schaafsma, Nadia Sitas, Paula Ungar, Yuki Yoshida, Egleé Zent, Sacha Amaruzaman, Ariane M. Amin, Cem Iskender Aydin, Anna Filyushkina, Marcello Hernández-Blanco, Pricila Iranah, Ann-Kathrin Koessler, Dominic Lenzi, Bosco Lliso, Natalia Lutti, Lelani Mannetti, Ana Sofía Monroy Sais, Ranjini Murali, Sara Nelson, Evonne Yiu.

The review editors:

Simon Anderson, Susan Baker, Juan Camilo Cárdenas, Joji Cariño, Kai Chan, Joshua Farley, Chuks Okereke, Laura Pereira, Ernesto Ráez, Hebe Vessuri, Robert T. Watson.

The IPBES management committee:

Bibiana Vilá, Antonio Díaz-de-León, Chimere Diaw, Mersudin Avdibegovic, Julia Marton-Lefevre, Rashad Allahverdiyev.

The methodological assessment report on

THE DIVERSE VALUES AND VALUATION OF NATURE

SUMMARY FOR POLICYMAKERS

AUTHORS:[1]

Unai Pascual (Spain/Switzerland), Patricia Balvanera (Mexico), Michael Christie (United Kingdom of Great Britain and Northern Ireland), Brigitte Baptiste (Colombia), David González-Jiménez (IPBES), Christopher B. Anderson (Argentina, United States of America/Argentina), Simone Athayde (Brazil/United States of America), David N. Barton (Norway), Rebecca Chaplin-Kramer (United States of America), Sander Jacobs (Belgium), Eszter Kelemen (Hungary), Ritesh Kumar (India/Wetlands International), Elena Lazos (Mexico), Adrian Martin (United Kingdom of Great Britain and Northern Ireland), Tuyeni H. Mwampamba (United Republic of Tanzania/Mexico), Barbara Nakangu (Uganda), Patrick O'Farrell (South Africa), Christopher M. Raymond (Australia, Netherlands/Sweden, Finland), Suneetha M. Subramanian (India/United Nations University Institute for the Advanced Study of Sustainability), Mette Termansen (Denmark), Meine van Noordwijk (Netherlands/Indonesia), Arild Vatn (Norway).

1. Authors are listed with, in parentheses, their country or countries of citizenship, separated by a comma when they have more than one, and, following a slash, their country of affiliation, if different from the country or countries of their citizenship, or their organization if they belong to an international organization. The countries and organizations having nominated the experts are listed on the IPBES website.

KEY MESSAGES

KEY MESSAGES

The assessment of the diverse values and valuation of nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) provides guidance to navigate pathways for reconciling people's good quality of life with life on Earth and advancing the intertwined economic, social and environmental dimensions of sustainable development in a balanced manner **(Figure SPM.1)**.[2] It includes an understanding of the relations between different world-views and values, a values typology, guidelines for designing and implementing valuation methods and processes, and for embedding the diverse values of nature into decision-making and policymaking.

The assessment also highlights key capacities for working with multiple values to leverage transformative change[3] across different stakeholders and institutions. Nature is understood by IPBES and by the assessment in an inclusive way, encompassing multiple perspectives and understandings of the natural world, such as biodiversity and the perspectives of indigenous peoples and local communities who use and embody concepts like Mother Earth. In addition, the assessment of the diverse values and valuation of nature is expected to contribute to achieving the 2050 Vision for Biodiversity, the 2030 Agenda for Sustainable Development and the future post-2020 global biodiversity framework, towards just and sustainable futures.

2. SPM: summary for policymakers.
3. The undertaking of an assessment on transformative change, which will build on the assessment of the diverse values and valuation of nature and other IPBES products, was approved by the Plenary of IPBES at its eighth session, for consideration at its eleventh session.

KM1[4] **The causes of the global biodiversity crisis and the opportunities to address them are tightly linked to the ways in which nature is valued in political and economic decisions at all levels {A4, A9, C1, C7, C8}.**

Unprecedented climate change and decline of biodiversity are affecting ecosystem functioning and negatively impacting people's quality of life. An important driver of the global decline of biodiversity is the unsustainable use of nature, including persistent inequalities between and within countries, emanating from predominant political and economic decisions based on a narrow set of values (e.g., prioritizing nature's values as traded in markets). Simultaneously, access to and distribution of the benefits from nature's many contributions to people are highly inequitable.[5, 6] Yet, a consolidated global consensus reflected by the 2030 Agenda for Sustainable Development and the 2050 Vision for Biodiversity has established a shared vision of prosperity for people and the planet. Achieving this vision depends on system-wide transformative change that incorporates the diverse values of nature and is aligned with the mutually supportive goals of justice and sustainability and their intertwined economic, social and environmental dimensions.

KM2 **Despite the diversity of nature's values, most policymaking approaches have prioritized a narrow set of values at the expense of both nature and society, as well as of future generations, and have often ignored values associated with indigenous peoples' and local communities' world-views {A4, A8, A9, B10, C1, C3}.**

People perceive, experience and interact with nature in many ways. This results in different understandings of the role that nature plays as the foundation of people's lives and in contributing to their quality of life, leading to a diverse range of values related to nature. However, policymaking largely disregards the multiple ways in which nature matters to people in that it often prioritizes a narrow set of nature's values.

For example, the predominant focus on supporting short-term profit and economic growth typically relies on macroeconomic indicators like gross domestic product. Such indicators generally consider only those values of nature reflected through markets and therefore do not adequately reflect changes in quality of life. One important reason is that they overlook the non-market values associated with nature's contributions to people,

4. KM: key message.
5. IPBES (2019): Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Brondizio, E.S., Settele, J., Díaz, S., and Ngo, H.T. (eds). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.3831674
6. H. O. Pörtner, R.J. Scholes *et al.* (2021): IPBES-IPCC Co-Sponsored Workshop Report on Biodiversity and Climate Change; IPBES and IPCC, doi:10.5281/zenodo.4782538.

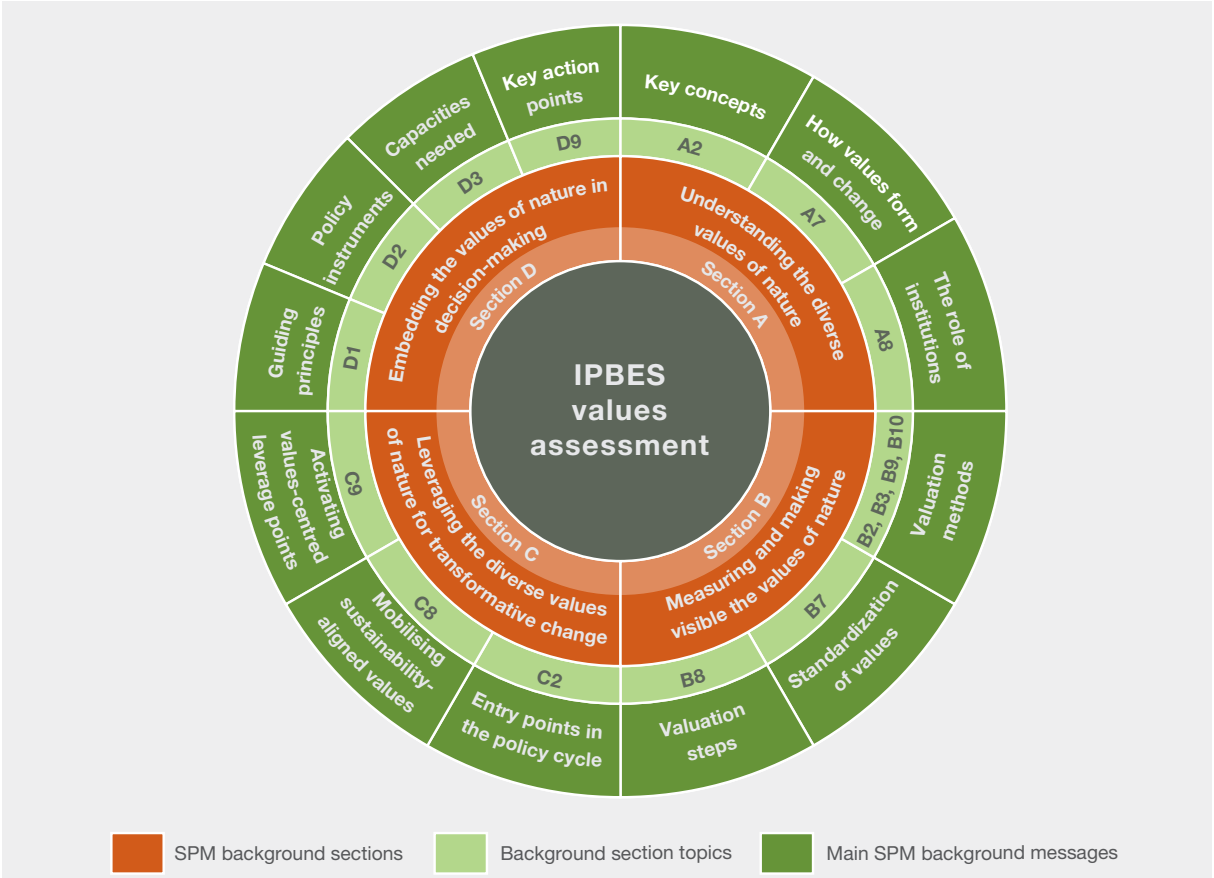


Figure SPM 1 **The values assessment wheel.**

The assessment of the diverse values and valuation of nature provides guidance on the diverse values of nature and how to integrate them into decision-making. **Figure SPM.1** illustrates the structure of the background section, by showing the main section themes and how they are linked to specific issues and background messages.

including the functions, structure, and ecosystem processes upon which life depends. In addition, such indicators do not account for the over-exploitation of nature and its ecosystems and biodiversity and the impact on long-term sustainability. Conservation policies that focus on biodiversity for its own sake may downplay other values and exclude local populations that depend on nature for their livelihoods. The use of a restricted set of values of nature that underpins many development and environmental policies is embedded in and promoted by societal norms and formal rules.

KM3 The diversity of nature's values in policymaking can be advanced by considering a typology of nature's values that encompasses the richness of people's relationships with nature {A1, A2, A3, A4, A5}.

The values of nature vary greatly across knowledge systems, languages, cultural traditions and environmental contexts. People and nature can be seen as part of holistic and interdependent systems of life, or, in other worldviews, considered as separate from one another. Diverse understandings of nature are expressed in different ways (e.g., via symbols, rituals, languages, and data and models). Given the diversity of world-views, cultures, knowledge systems and disciplines, it is challenging to define nature's values in a universally practical and acceptable way. A comprehensive typology of the diverse values of nature can help guide decisions that affect nature and its contributions to people in diverse contexts, including economic (e.g., investment, production, consumption), political (e.g., recognition of individual and collective rights and duties) or sociocultural (e.g., forming, maintaining or changing peoples' sociocultural identities) decisions.

A typology of nature's values **(Figure SPM.2)** requires value perspectives that encompass the richness of people's relationships with nature, including: (i) *world-views*, the ways in which people conceive and interact with the world; (ii) *knowledge systems*, bodies of knowledge, practices and beliefs such as academic, indigenous and local knowledge systems embodied in world-views; (iii) *broad values*, the moral principles and life goals that guide people-nature

interactions; (iv) *specific values*, judgements regarding the importance of nature in particular contexts, grouped into *instrumental values* (i.e., means to a desired end often associated with the notion of "ecosystem services"), *relational values* (i.e., the meaningfulness of human-nature interactions), and *intrinsic values* (i.e., independent of people as valuers); and (v) *value indicators*, the quantitative measures and qualitative descriptors used to denote nature's importance in terms of biophysical, monetary or sociocultural metrics. The values typology helps to promote the use of values that have been underutilized in decision-making.

People conceive of or relate to nature in multiple and often complementary ways: living *from, with, in,* and *as* nature. These different ways of relating to nature reflect people's different world-views. Although this typology may not capture the full range of values linked to various knowledge systems, it can help to understand how certain human-nature relationships can be incorporated into particular policy decisions.

KM4 Valuation processes can be tailored to equitably take into account the values of nature of multiple stakeholders in different decision-making contexts {A5, A6, B1, B6, B8, C2}.

Valuation is an explicit, intentional process in which agreed-upon methods are applied to make visible the diverse values that people hold for nature. The type and quality of information obtained from valuation depend on how, why and by whom valuation processes are designed and implemented. The way valuation is conducted, including the methods chosen, is in part determined by power relations in society, which influence which and whose values of nature are recognized and how equitably the benefits and burdens arising from these decisions are distributed.

Considering the values of multiple individuals, stakeholders and interest groups at scales beyond the individual is an essential part of valuation. One way is to aggregate individual or group values into social values, which can be weighted to account for differences between stakeholders (e.g., income disparities). Another way is to collectively form or express shared social values through deliberative processes, which can help bridge multiple values that are difficult to aggregate (e.g., via talking circles). These are two complementary strategies, yet any strategy to achieve valuation beyond the individual needs to consider challenges of representation, inequity (e.g., within and between generations) and asymmetric power relations (e.g., predominance of certain world-views) among the actors affected.

Furthermore, the following five steps help guide valuations: (i) constructing a legitimate process; (ii) defining the purpose of valuation; (iii) scoping the valuation; (iv) selecting and applying valuation methods; and (v) articulating the values into decision-making. These steps can increase robustness of valuations to inform different decision-making contexts, including in the context of indigenous peoples' and local communities' territories.

KM5 More than 50 valuation methods and approaches, originating from diverse disciplines and knowledge systems, are available to date to assess nature's values; choosing appropriate and complementary methods requires assessing trade-offs between their relevance, robustness and resource requirements {B1, B2, B3, B4, B5, B8, B9, B10}.

There exist many valuation methods and approaches to elicit and assess the diverse values of nature. Valuation methods, originating from diverse disciplines and knowledge systems (including indigenous peoples and local communities), can be grouped into four non-disciplinary "method families" **(Table SPM.1)**: (i) *nature-based valuation* gathers, measures or analyses information about the properties of nature and its contributions to people; (ii) *statement-based valuation* directly asks people to express their values; (iii) *behaviour-based valuation* identifies how people value nature by observing their behaviour and practices; and (iv) *integrated valuation* brings together various types of values assessed with different information sources. Each method family relies on different data sources, different levels and forms of social participation, identifies different value types, and has specific technical and skill requirements and limitations. While the method families help highlight the commonalities of procedures across different valuation traditions, other considerations are needed to fully appreciate the variations of valuation undertaken according to specific knowledge systems, particularly those of indigenous peoples and local communities.

Different valuation approaches have trade-offs between relevance (i.e., salience in terms of the values that can be used in decisions), robustness (i.e., reliable, consistent and socially representative) and resources (i.e., time, financial, technical and human resources). Given the diversity of social, economic and ecological contexts, there is no one-size-fits-all valuation method and available valuation methods may be adapted to address local realities. The use of complementary methods helps to make a wider diversity of values visible, while improving the quality and legitimacy of the information generated to support decisions about nature.

KM6 Despite increasing calls to consider valuation in policy decisions, scientific documentation shows that less than 5 per cent of published valuation studies report its uptake in policy decisions {B7, C2, C3, C9, D4}.

International initiatives (e.g., the Aichi Biodiversity Targets, The Economics of Ecosystems and Biodiversity; the System of Environmental-Economic Accounting – Ecosystem Accounting; various "inclusive/comprehensive wealth" approaches; United Nations General Assembly resolution

74/244 on harmony with nature) have promoted the integration of the values of nature into national-level policies. Yet, the vast majority of peer-reviewed literature on valuation studies do not document influence on decisions. A majority of countries have not made progress at a rate that would have allowed achievement of Aichi Target 2 by 2020 of integrating biodiversity values into strategies, planning process and accounting, as reported in their national reports to the Convention on Biological Diversity.

The uptake of valuation in Governmental decision-making is more likely when the valuation process is relevant to the different stages of policymaking and when it is sufficiently resourced. Furthermore, documenting the use and impact of valuation knowledge can be improved by iterating studies through the policy cycle. Valuation uptake can also be improved by co-production of valuation knowledge, best practice guidance, standardization of valuation methods where this is suitable, and more use of participatory and deliberative methods that represent indigenous peoples' and local communities' values. Gaps in knowledge and capacities are more prevalent in developing countries.

KM7 Achieving sustainable and just futures requires institutions that enable a recognition and integration of the diverse values of nature and nature's contributions to people {A4, A8, C1, C4, C5, C6, C7, C9}.

Informal social conventions and norms and formal legal rules (i.e., institutions) govern people's lives and regulate actions by decision makers. In addition, institutions play a crucial role in shaping how nature is valued within and across societies. Institutions influence which values become socially legitimized and which ones are excluded from decision-making. Hence, ensuring greater transparency about which values are embedded in institutions is key to recognizing the values of nature that are at stake in any decision-making context. Enhancing the institutional and technical capacities to monitor and assess nature's contributions to people is also crucial to improve uptake of valuation methods and practices, and enable more transparent and inclusive decision-making processes.

Reforming existing institutions and creating new ones can improve political, economic and social decision-making, mainstreaming the consideration of nature's diverse values and leading to better outcomes for people and nature. For example, policies giving local people authority in protected area management often result in improvement of people's good quality of life and more effective, long-lasting conservation. Tackling power asymmetries is important because power shapes the extent to which the values held by different actors are considered in decision-making. Institutions that enable more diverse values to be considered have greater potential to avoid or mitigate conflicts, as these often arise from not identifying and anticipating value clashes. Recognizing and respecting the world-views, values and traditional knowledge of indigenous peoples and local communities and the institutions that support their rights, territories or interests allow policies to be more inclusive of how different people live, relate to and value nature, which also translates into better outcomes for people and nature.

KM8 **Transformative change needed to address the global biodiversity crisis relies on shifting away from predominant values that currently over-emphasize short term and individual material gains, to nurturing sustainability-aligned values across society {A3, A7, C1, C7, C8, C9}.**
Putting sustainability at the heart of decision-making can be supported by redefining "development" and "good quality of life", and recognizing the multiple ways in which people relate to each other and to nature. Societal goals will need to align more strongly with broad values like justice, stewardship, unity and responsibility, both towards other people and towards nature. This shift in the framing of decision-making can be supported by ensuring that a more balanced range of values are considered in political and economic decisions by: (i) reducing the dominance of those broad values that mostly relate to individualism and materialism, whilst mobilizing broad values that are consistent with living in harmony with nature; and (ii) reducing the dominance of specific values to remove the dominance of market-based instrumental values, whilst mobilizing relational, intrinsic and nonmarket instrumental values.

Balancing and mobilizing values can be facilitated by participatory processes for envisioning alternative futures that are inclusive of diverse world-views, knowledge systems and values. Various pathways can contribute to achieving just and sustainable futures, including, but not limited to, the "green economy", "degrowth", "Earth stewardship", "nature protection" and other pathways arising from diverse world-views and knowledge systems (e.g., living well and other philosophies of good living). All of these sustainability pathways are associated with certain sustainability-aligned values and seek a more diverse valuation of nature as a foundation for reconciling social, economic and ecological dimensions. These and many other pathways from other world-views and knowledge systems (e.g., living well in harmony with Mother Earth, among others) reflect different perspectives on how best to bring about values-based transformative change. However, all are founded on the need to rebalance the range of values shaping individual and collective decisions.

KM9 **Working with a combination of four values-based leverage points (i.e., undertaking valuation, embedding values in decision-making, reforming policy and shifting societal goals) may catalyse transformation towards sustainable and just futures {C1, C9}.**
Transformative change is more likely to be catalysed through actions that target a combination of values- and valuation-based leverage points. These are: (i) recognizing the diversity of nature's values through undertaking relevant and robust valuation; (ii) embedding valuation into the different phases of decision-making processes to allow meaningful consideration of nature's diverse values; (iii) reforming policy in order to realign incentives, rights, and legal regulations with the diverse values of nature and to empower actors to

express and act upon their sustainability-aligned values; and (iv) creating spaces to deliberate, develop and shift societal goals and norms attuned to the agreed global objectives of sustainability and justice **(Figure SPM.7)**. Activating the latter two deeper leverage points can be facilitated by aligning bottom-up approaches (e.g., empowering civil society via public deliberation) with top-down ones (e.g., changing regulations and policy frameworks).

KM10 Information, resource (i.e., technical and financial) and capacity gaps hinder the inclusion of diverse values of nature in decision-making. Capacity-building and development, and collaborations among a range of societal actors, can help bridge these gaps {D1, D2, D3, D4, D5, D6, D7, D8, D9}.

The transformative changes needed to implement the 2030 Agenda for Sustainable Development, the future post-2020 global biodiversity framework and the 2050 Vision for Biodiversity can be advanced by bridging key knowledge-to-action gaps, which are unequally distributed between the developed and developing regions of the world. Such gaps can be addressed through meaningful, context-specific, inclusive, legitimate, and iterative consideration of the role of diverse values of nature in decisions. Sustainability-aligned values, including those of indigenous peoples and local communities, can guide the design and implementation of transformative policy instruments, cross-sectoral development policies, as well as policy initiatives across scales.

Aligning values with sustainability necessitates addressing conflicting values. This in turn calls for developing the capacities of various types of decision makers to: (i) enhance their motivation to recognize and address power and equity asymmetries; (ii) use suitable valuation methods and approaches by enhancing the availability of resources needed (e.g., technical and financial); (iii) foster inclusive social learning that involves different types of knowledge, including traditional knowledge of indigenous peoples and local communities; (iv) negotiate compromises among stakeholders' different interests and values towards achieving equitable outcomes; (v) improve coherence across sectors and jurisdictional scales; and (vi) increase transparency and accountability in decision-making.

Overcoming knowledge-to-action gaps, such as those related to understanding and addressing power asymmetries among stakeholders and their values, and fitting valuation supply to demand, would advance values-centred, system-wide transformations. Values-centred transformations, through collaborations among the range of societal actors, are relevant to revert the current biodiversity crisis and to build more sustainable and just futures for people and nature.

BACK-GROUND MESSAGES

BACKGROUND MESSAGES

A. Understanding the diverse values of nature.

A1 Over millennia, around the world, people have developed many ways of understanding and connecting with nature, leading to a large diversity of values of nature and its contributions to people *(well established)*.

Many academic disciplines have studied human-nature relationships, leading to multiple conceptualizations of the values of nature *(well established)* {2.1.1; 2.3.1}. In science and management, the ecosystem services framework has been extensively used to relate different facets of nature to people's good quality of life. The IPBES framing of nature's contributions to people aims to more explicitly include values like responsibility, reciprocity and respect for nature, as well as to embrace other knowledge systems that conceive people as part of nature, such as those of indigenous peoples and local communities and emerging movements centred around holistic people-nature wellness *(well established)* {2.2.1; 2.2.2; 2.2.3.2; 2.3.2.1; 4.4.2; 4.4.3}.

The many ways that people relate to nature, which can be organized into generalized modes of *living from*, *in*, *with* and *as* nature, also reflect their diverse world-views, knowledge systems, broad and specific values *(established but incomplete)* {2.3.2}. When people see themselves as *living from* nature, they emphasize nature's capacity to provide resources for sustaining livelihoods, needs and wants. As such, a river is valued for the fish it provides for people's consumption. People also may see themselves as *living with* nature, valuing its life-supporting processes in connection with "other-than-humans". In this case, the fish in a river are seen as having the right to thrive independently of people's needs. *Living in* nature refers to the importance of places as settings for people's lives, practices, and cultures. Consequently, a riverine landscape is valued as territory that contributes to people's sense of place and identity. Finally, people may see themselves as part of nature or in terms of *living as* nature, perceiving it as a physical, mental, and spiritual part of themselves. In this case, a river is valued as sacred or family because it supports relations of kinship and interdependence *(well established)* {2.2.1; 2.3.2.1}. These interpretations of nature are not mutually exclusive, and one life frame is not inherently better than another. Instead, they may be expressed together in varying combinations over different times and contexts.

A2 Using a typology of the values of nature can provide guidance to decision makers on understanding and engaging with the diverse ways in which people relate to and value nature *(well established)*.

The term "value" conveys multiple ideas associated with goals, principles, priorities, and levels of importance.[7] Therefore, it is challenging to define nature's values in a universally intelligible and accepted way across cultures and academic traditions *(well established)* {2.2.3; 2.2.4}. Nevertheless, a core set of concepts can inform a policy-relevant standardized values typology, including the following: world-views, knowledge systems, *broad values, specific values* and *value indicators* **(Figure SPM.2)**. This typology synthesizes multiple theoretical perspectives on values and can be used by decision makers to consider the multiple understandings and policy implications of the diverse values of nature *(well established)* **(Box SPM.1)** {2.2.1; 2.2.2; 2.2.3; 2.2.4}. The values typology can help policymakers identify how different types of values can best be handled in different decision-making contexts; for example, when values can be directly compared, overlaid or used in parallel *(established but incomplete)* {2.2.3.3, 2.4.2.1; 3.3.1.3}. The typology can also be used to: (i) make visible otherwise neglected, intangible or detrimental contributions from nature, thereby facilitating a more inclusive and just expression of value; and (ii) build common ground across different stakeholders in support of biodiversity conservation and sustainable use and/or sustainable development by highlighting points of convergence or overlap between value types *(established but incomplete)* {2.2.3.3}.

A3 The multiple ways in which people conceive good quality of life are reflected in how they express broad values that shape people's interactions with nature, such as unity, responsibility, stewardship and justice, which can align with sustainability *(well established)*.

People and nature are interdependent, and understandings of how nature contributes to good quality of life vary across world-views and knowledge systems (e.g., some indigenous peoples and local communities conceive good quality of

7. IPBES (2015): Preliminary Guide Regarding Diverse Conceptualization of Multiple Values of Nature and Its Benefits, Including Biodiversity and Ecosystem Functions and Services (deliverable 3 (d)), annex III to document IPBES/4/INF/13.

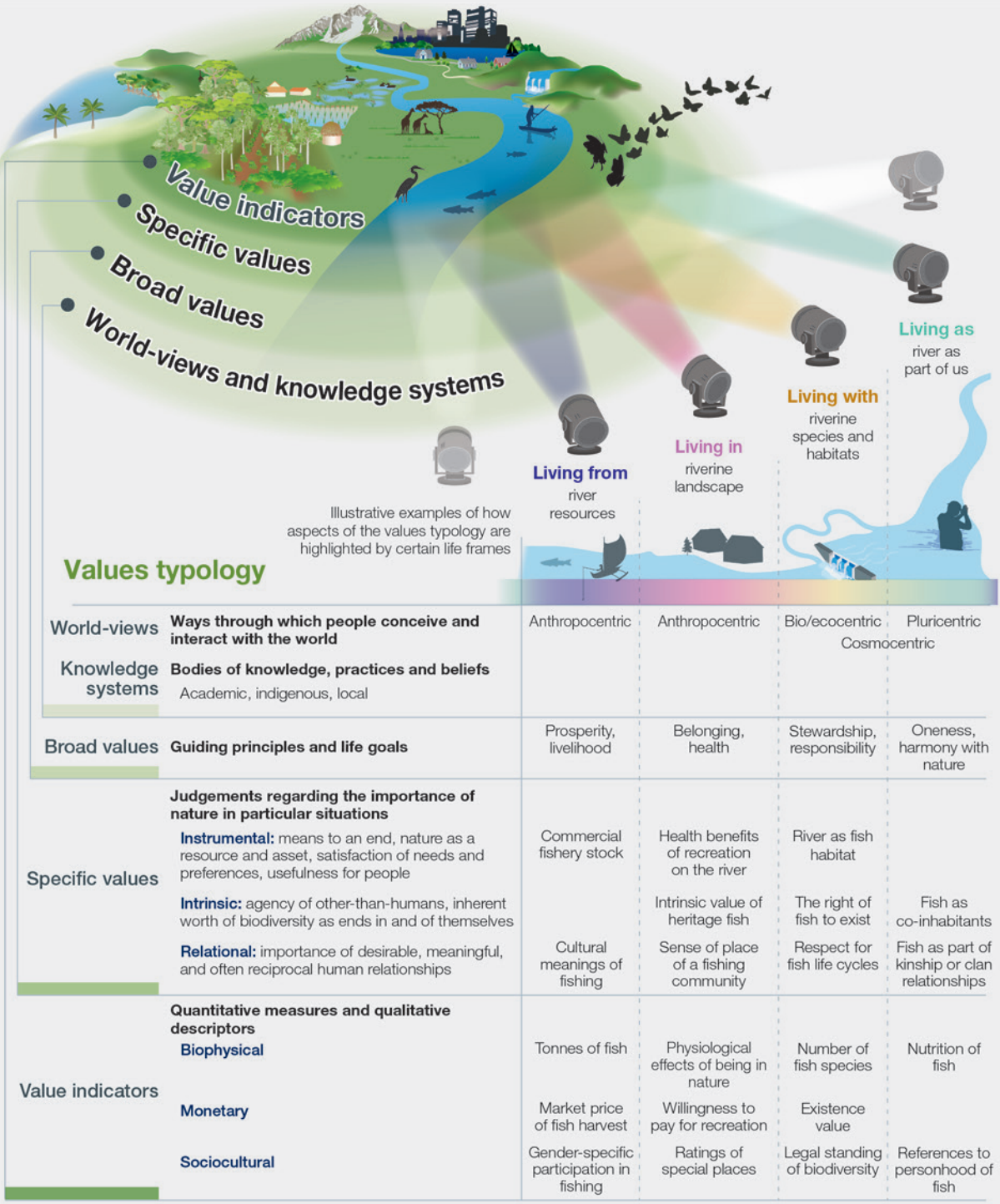


Figure SPM 2 **The values assessment typology highlights key concepts and their interrelationships to understand the diverse values of nature.**

The figure centres on potential foci of value (e.g., agroecosystems, biodiversity, cities, rivers) and concentric circles illustrate different value types and dimensions (world-views, broad and specific values, nature's contributions to people and value indicators). Life frames are not mutually exclusive; individuals or groups can hold multiple frames. Metaphorically, they are light beams that cut across value categories. Examples are highlighted of some values that might be given prominence in the context of a freshwater ecosystem {2.2; 2.3}.

Box SPM 1 **Definitions of key concepts to help understand the diverse values of nature.**

World-views are like lenses through which people perceive, make sense of and act upon the world. Embedded in cultures and languages, world-views shape people's values in their relationships with other people and with nature. Anthropocentric world-views prioritize people; bio/ecocentric world-views emphasize nature's inherent value and its evolutionary and ecological processes. An example of the application of a bio/ecocentric world-view in policy is the recognition of the rights of Mother Earth. Pluricentric world-views focus on relationships between humans and other-than-humans, as well as nature's elements and systemic processes {2.2.1}. Cosmocentric world-views can be understood as bridging bio/ecocentric and pluricentric world-views. They refer to living in harmony with all forms of existence that are considered alive and connected by reciprocal and interdependent relationships {2.2.1}.

Knowledge systems are dynamic bodies of knowledge, practices and beliefs, pertaining to the relationships of living beings, including people, with one another and with nature, embedded in world-views. Scientific knowledge systems entail explicit knowledge derived from applying formal and generalizable methods. Indigenous and local knowledge, which includes traditional knowledge, is highly diverse, grounded in territory and sociocultural identity and is based on different knowledge types (e.g., written, oral, visual, tacit, practical) {2.2.1}.

Broad values are general moral guiding principles and life goals (e.g., freedom, justice, responsibility, harmony with nature, harmony with Mother Earth, health, prosperity) informed by people's world-views and beliefs. They are often embedded in a society's institutions (i.e., informal social conventions and norms, and formal legal rules) and can underpin people's specific values of nature {2.2.3.1}.

Specific values are judgements regarding nature's importance in particular situations {2.2.3.2}. They can be grouped into *instrumental, intrinsic* and *relational values. Instrumental* values relate to things that are a means to a desired end and tend to be associated with nature (e.g., as asset, capital, resources) and its contributions to people. *Intrinsic* values relate to the values of nature expressed independently of any reference to people as valuers and include entities such as habitats or species that are worth protecting as ends in and of themselves. *Relational values* refer to the meaningfulness of people-nature interactions, and interactions among people (including across generations) through nature (e.g., sense of place, spirituality, care, reciprocity) {2.2.3}.

Value indicators are quantitative measures and qualitative descriptors that reflect nature's importance to people. Indicators are generally grouped as biophysical, monetary and sociocultural {2.2.4}.

Life frames of nature's values allow the organization and communication of the richness of the relationships between people and nature. A set of life frames (e.g., living *from, with, in* and *as* nature) can be used to organize and reflect distinct sets of values found in the typology. Life frames are diverse and not mutually exclusive, but help to understand how certain values are highlighted in particular decision-making contexts and can inform the design of integrated valuations {2.3.1; 1.2.3}.

life as living in harmony with nature or as living in harmony with Mother Earth) *(well established)* {2.2.1; 2.2.2}. Values form and evolve alongside and in response to changing world-views, beliefs, spiritual and cultural practices and socioeconomic conditions. They also become embedded in a society's informal social conventions and norms, and formal legal rules. These institutions influence behavioural standards that may inform and strengthen certain specific values (i.e., instrumental, intrinsic and relational values) which in turn reflect the multiple understandings of nature's role in achieving good quality of life *(well established)* {*2.4.1; 2.5.1*}.

The broad values that shape people's interactions with nature and with each other can align with sustainability when they emphasize principles like unity, responsibility, stewardship and justice *(well established)* {2.2.3.1; 5.2.2; 5.3.2}. Such "sustainability-aligned values" depend on whether and how they refer to people's particular relationships with one another or with nature, as expressed by specific values *(well established)* {5.2.2; 5.3.2}. For example, the broad value of responsibility can be expressed by recognizing and promoting people's views about how to pursue meaningful relationships with nature or by supporting nature through environmental education *(well established)* {5.5.4}. Similarly, the broad value of stewardship may be expressed by developing biodiversity management plans that support or align with human communities' interests (human-human relations like shared goals of a good quality of life) or by enacting care towards nature (e.g., human-nature relations like reducing overconsumption). Likewise, justice can be emphasized by recognizing diverse values in ways that ensure fair decision-making procedures and equitable distribution of nature's contributions to people or that strengthen environmental legislation (*well established)* {5.1; 5.3.2; 5.5.1; 2.2.3}.

A4 The complementary objectives of justice and sustainability can be advanced through better recognition and uptake of nature's diverse values in political, economic and sociocultural decision-making *(well established)*.

Thirteen of the Sustainable Development Goals explicitly call for equitable opportunities and reducing inequalities, including gender equality, youth empowerment, poverty eradication and fair participation of indigenous peoples

and local communities *(well established)* {1.2.4.1}. There is strong evidence that justice, equity and sustainability are mutually supportive *(well established)* {4.5.2; 4.5.5; 5.1.2.2; 5.2.2.3.1; 5.5.2; 5.5.3; 5.5.4}. For example, the effectiveness and perceived fairness of policies on protected areas can be compromised when they restrict access to nature and undermine local livelihoods, often leading to conflict and exacerbating pre-existing inequalities *(well established)* {4.5.2}. Conversely, a lack of sustainability can undermine justice. For example, declines in biodiversity reduce options for present and future generations to sustain a good quality of life, thereby compromising the principle of intergenerational equity *(well established)* {1.2.4.1}. The uptake of a wider diversity of values of nature is a way to advance the integrated global goals of justice and sustainability *(well established)* {2.1.1; 2.4.1.4}, but economic and social power asymmetries also need to be overcome **(Box SPM.2)**.

A5 Incorporation of the diverse values of nature in decisions requires consideration of whether and how values can be directly compared, made compatible, or be considered in parallel *(well established)*.

The diverse values of nature can be measured using a wide range of biophysical, monetary and sociocultural indicators. However, there are challenges to combining different indicators. Values are directly *comparable* when they are measured using the same metric. For example, cost-benefit analyses of infrastructure and development projects, such as roads, mines or dams, can use a monetary indicator to compare investment costs versus market and non-market economic benefits. Similarly, biophysical measures may be used to compare hectares of habitat lost due to a development project versus hectares restored to offset the loss. *Compatible* values share features that allow them to be considered together and reveal value trade-offs, even when using different indicators (e.g., spatially overlaying different bundles of nature's contributions to people measured with biophysical, monetary and sociocultural indicators). Yet, other values cannot be brought together because they are neither comparable nor compatible (i.e., they are *incommensurable*). For example, while a development project may be assessed on the basis of instrumental values (e.g., in terms of economic benefits, including jobs), it may also affect relational values associated with the loss of sacred sites. While these different values may not be directly comparable, nor made compatible (and hence ranked or compensated for), decisions can still consider them in parallel, such as through respectful deliberative discussions with affected parties (*well established*) {2.2.3.3; 2.4.2.1; 3.3.1.3}.

A6 The way decision-making considers the values of nature at varying societal scales (e.g., local communities, countries) has implications for how different social groups are represented in decisions *(well established)*.

Decision-making based on *social values* often involves measuring changes in individuals' quality of life and aggregating them. It also considers how the resulting

Box SPM 2 A values perspective on justice and power.

Justice is a broad value connected to the principle of fairness, i.e., the fair treatment of people and other-than-human nature, including inter- and intra-generational equity {1.2.4.1; 2.2.3, 3.3.2.3; 5.1}. Achieving justice implies considering its various dimensions, including: (i) *recognition justice*, acknowledging and respecting different world-views, knowledge systems and values; (ii) *procedural justice*, making decisions that are legitimate and inclusive for those holding different values; and (iii) *distributional justice*, ensuring the fair distribution of nature's contributions to people {1.2.4; 2.4.1.4; 2.4.2.3.1; 3.3.1; 4.5.1}.

Values-centred policies to advance justice involve engaging with and addressing power asymmetries {1.2.4; 2.4.1.4; 5.3.2.3}. Social, economic and political processes shape power relations that constrain access to and control over nature and its contributions to people {2.4.1.4; 4.4.2; 4.4.3.1; 4.5.2; 4.5.3}. Power is exercised through the development of institutions (i.e., informal social conventions and norms, and formal legal rules) that establish the legitimate ways of relating to nature, who decides, whose values count, who can benefit from nature's contributions and who bears the cost of ecosystem degradation {2.4.1.4; 4.3.1; 4.3.2; 4.3.5}. For example, within the international conservation movement, the multiple values associated with biodiversity conservation have not always been inclusive of the needs of indigenous peoples and local communities and have tended to favour the intrinsic values of biodiversity promoted by other stakeholders. This narrative has often underpinned global and national agendas that marginalize alternative discourses, such as biocultural diversity perspectives that draw on instrumental and relational values of nature {2.4.1.4; 4.4.2.2; 4.5.2; 5.5.4}. Hence, managing the different dimensions of justice allows for the different roles of power asymmetries in shaping people's relations to (and values of) nature to be dealt with. This can strengthen the representation of values of underrepresented social groups in decisions through ensuring a participatory process {4.5}.

Respect for the different ways of valuing nature is an act of recognition that can advance just decision-making and allow for the mainstreaming of these values into policy {1.2.4; 2.3.2}. For example, recognizing the role of women in the stewardship of nature and overcoming power asymmetries frequently related to gender status can advance the inclusion of the diversity of values in decisions about nature {1.2.4; 2.2.1; 4.5.2; 4.5.3; 4.5.5}.

positive and negative impacts on good quality of life are distributed across society (*well established*) {2.4.2.1; 3.3.1.1; 3.3.2.3}. Representing societal values as the sum of individual values is a common approach, such as in cost-benefit analyses, but carries the risk of overlooking values held by minority groups (*well established*) {2.2.3.2; 2.4.2.1}.

Decision-making based on *shared values* seeks to have people express their values collectively. Shared values can be formed through long-term communication and socialization processes or through group deliberations. Shared value formation approaches can enhance the legitimacy of decisions in complex, highly uncertain and contested decision-making situations, and where values held at the individual scale cannot be aggregated (*well established*) {2.4.2.1; 2.5.1; 3.2.2.4; 3.2.2.2; 3.3.2.3}.

Social values, aggregated from individual values, have tended to be used more often in policy decisions than shared values (*established but incomplete*) {2.4.2.1; 3.2.2.4; 5.3.3}. Aggregation of individual values can inform deliberative processes and vice versa, implying that social and shared values are complementary *(established but incomplete)* {2.4.2.1}.

A7 Understanding how values are formed, changed and eroded helps policymakers identify options to achieve decision outcomes that better align with sustainability objectives *(well established)*.

Broad values tend to be relatively stable, largely forming in early life stages (e.g., childhood, early adulthood) *(well established)* {2.5.1}. However, they can be influenced by targeted value formation policies (e.g., education programmes, awareness campaigns) or significant life events (e.g., parenthood) *(established but incomplete)* {2.5.1; 5.3.2.4}. Broad values tend to change over inter-generational time scales but can shift more rapidly due to major transformations (e.g., demographic shifts, pro-environmental movements) and social-ecological disturbances (e.g., pandemics, natural disasters) *(established but incomplete)* {2.5}. In contrast, specific values are malleable and can be changed by modifying the contexts that determine their prioritization. For example, environmental management that prioritizes biodiversity as a natural asset (i.e., instrumental value) can be modified by new regulatory procedures. In this way, specific values like meaningful relationships with nature (i.e., relational value) or the worth of species in and of themselves (i.e., intrinsic value) can also be considered *(established but incomplete)* {2.4.1; 2.4.2; 2.5.1; 5.3.4}.

While values influence individual and collective decisions, other factors like knowledge, beliefs, opportunities, and skills also affect behaviour. The inability to fully explain behaviour based on values is known as the "valueaction gap" (*well established*) {2.4.1; 2.4.2}. Therefore, in addition to forming new values, policies can also ensure that conditions exist for people to prioritize existing but latent sustainability-aligned values *(established but incomplete)* {2.4.1; 2.5.2; 5.3.4}. Additionally, in the face of value erosion, policies combating linguistic and knowledge extinction can also ameliorate the loss of ways to experience and value nature *(well established)* {2.2.2; 5.5.4}.

A8 Institutions (i.e., informal social conventions and norms, and formal legal rules) are underpinned by and support certain values in ways that strongly influence whose values count in decisions *(well established).*

Institutions represent the informal social conventions and norms and formal legal rules that govern people's lives *(well established)* {1.2.1; 2.4.1; 2.4.2}. Informal social conventions facilitate coordination among people (e.g., language and measurement scales). Norms and legal rules are underpinned by societal values and enable or constrain human-human and human-nature relations by legitimizing which values are dominant in society and how they should be expressed (*well established*) {2.4.1.3}. Norms prescribe what should be done under certain conditions; legal rules provide formal sanctions to support dominant values (*well established*) {2.4.1.3}. Although some norms and legal rules emphasize broad values like responsibility for nature (e.g., local and indigenous institutions for protecting forests and coastal ecosystems, laws for ecosystem protection), others drive negative impacts on nature (e.g., weak regulations to control carbon emissions). Pressure from civil society may have the capacity to change priorities by powerful actors (e.g., investment decisions by pension funds and procurement decisions by the food industry) (*well established)* {2.2; 2.4.1; 2.4.2; 4.3; 4,4; 5.4; 5.5}.

Promoting changes in any institution can reconfigure how nature's values are considered in different types of political, economic and sociocultural decision-making {*well established*} {2.4}. For example, the implementation of more stringent environmental laws has positive impacts on the values that guide economic decisions by corporations and individual consumers when they interact in market transactions. Changes in values across society can also lead to institutional change, such as when organized civil society drives Governments to adopt more stringent environmental laws (*established but incomplete*) {2.4; 4.2; 4.4; 5.3}. For example, increased public awareness of plastic pollution has activated sustainability-aligned values in citizens that have pressured Governments to ban single-use plastic products. The role of institutions in prioritizing certain (broad and specific) values of nature is evident through locally- and nationally-defined rules, and international trade and environmental agreements (*well established*) {2.4; 4.3}.

A9 Predominant economic and political decisions have prioritized certain values of nature, particularly market-based instrumental values, often at the expense of non-market instrumental, relational and intrinsic values *(well established)*.

Globally, economic decisions have generally prioritized a narrow suite of instrumental values, particularly those of

nature's material contributions to people that are traded in markets (e.g., food, fibre, energy). These decisions have often ignored the externalities associated with the negative impacts on biodiversity and ecosystems *(well established)* {2.2; 2.4; 4.3}. Policymakers have the potential to ensure a more balanced consideration of nature's diverse values, but success in this regard has been limited *(well established)* {2.4.2.3; 4.5.2; 4.5.5}. Designing institutions that integrate economic, social and environmental policies to foster values inherent in sustainability and justice, that focus up-front on avoiding serious future impacts on nature and nature's contributions to people and that make people less dependent on economic development may be important strategies to handle the challenges the world faces, taking into account the needs of developing countries to raise living standards *(established but incomplete)* {2.4.2.3.2}.

B. Measuring and making visible the values of nature.

B1 Over 50 different methods to assess nature's values have been applied in diverse socialecological contexts around the world *(well established)*.
Valuation is the intentional process to make explicit the values individuals or communities hold about nature, nature's contributions to people, and human-nature relationships. Valuation is carried out by applying established or agreed-upon valuation procedures *(well established)* {3.1.1; 4.3; 4.4; 4.5}. A wide portfolio of valuation methods and approaches has been developed during the last four decades from disciplines such as anthropology, biology and economics, as well as from various indigenous and local traditions *(well established)* {3.2.2; 3.2.3;3.2.4}.

Valuation methods have been applied all around the world **(Figure SPM.3)** *(well established)* {3.2.1}. Most valuation studies have been undertaken in the Americas, Asia and the Pacific, and Europe and Central Asia, and to a lesser extent in Africa *(well established)* {3.2.1}. Valuation is more frequently applied in countries with severe threats to their biodiversity and environmental conditions, and where human and financial resources are available *(established but incomplete)* {3.2.1}.

The number of valuation studies undertaken has increased on average by more than 10 per cent per year over the last four decades *(well established)* {3.2.1}. More recently (2010–2020) the most prominent focus of valuation studies has been on the status of nature (65 per cent of 1,163 valuation studies reviewed) *(well established)* {3.3.1.1}, followed by the role of nature for people's quality of life and social justice *(well established)* {3.3.1.1} **(Figure SPM.3)**. Instrumental values are elicited more often (74 per cent) than relational and intrinsic values *(well established)* {3.2.3}. The dominant human-nature relationship framing of valuation studies is *living from nature* (41 per cent), compared to *living with, living in* and *living as* nature *(established but incomplete)* {3.2.3}. Regarding value indicators, biophysical (50 per cent) measures predominate in valuation, followed by monetary and sociocultural indicators **(Figure SPM.3)** *(well established)* {3.2.3}. Most reported valuations have been performed at the subnational scales (72 per cent), compared to national and global scales, with very few studies dealing with cross-regional or cross-national protected areas *(well established)* {3.2.1}, or with explicit reference to the territories of indigenous peoples and local communities *(well established)* {3.2.1}. Regarding ecological contexts, emphasis has been given to the value of nature's contributions to people from forests (25 per cent), cultivated areas and inland water bodies *(well established)* {3.2.1}.

B2 The large portfolio of valuation methods, originating from diverse disciplines and knowledge systems (including indigenous and local knowledge systems), can be grouped into four non-disciplinary method families that consist of nature-based, *behaviour-based, statement-based* and *integrated* methods *(well established)*.
Four main methodological groups or "method families" are distilled from the valuation literature based on the source of information about the values of nature **(Table SPM.1)**. *Nature-based valuation* gathers, measures or analyses information about the properties of nature and its contributions to people, and may be used to assess ecological integrity and to identify and quantify nature's contributions to people *(well established)* {3.2.2.1}. *Statement-based valuation* uses people's expressions of their relations to nature to deduce the importance of nature for people as well as their preferences; it helps understand the different world-views and motivations underlying peoples' reasons for valuing nature in terms of supporting their quality of life *(well established)* {3.2.2.2}. *Behaviour-based valuation* relies on observing what people do and the choices they make. Behaviour-based methods are relatively more robust against potential biases of valuation experts *(well established)* {3.2.2.3}. Finally, *integrated valuation* combines different sources of information on nature's values *(well established)* {3.2.2.4} and helps elucidate connections between different types of values *(well established)* {3.1.1; 3.2.2.4}. Rigid application of current method families to valuation practice by indigenous peoples and local communities can risk omitting or misrepresenting cultural and spiritual beliefs integral to their world-views and ways of living **(Table SPM.1)** *(established but incomplete)* {3.2.4}.

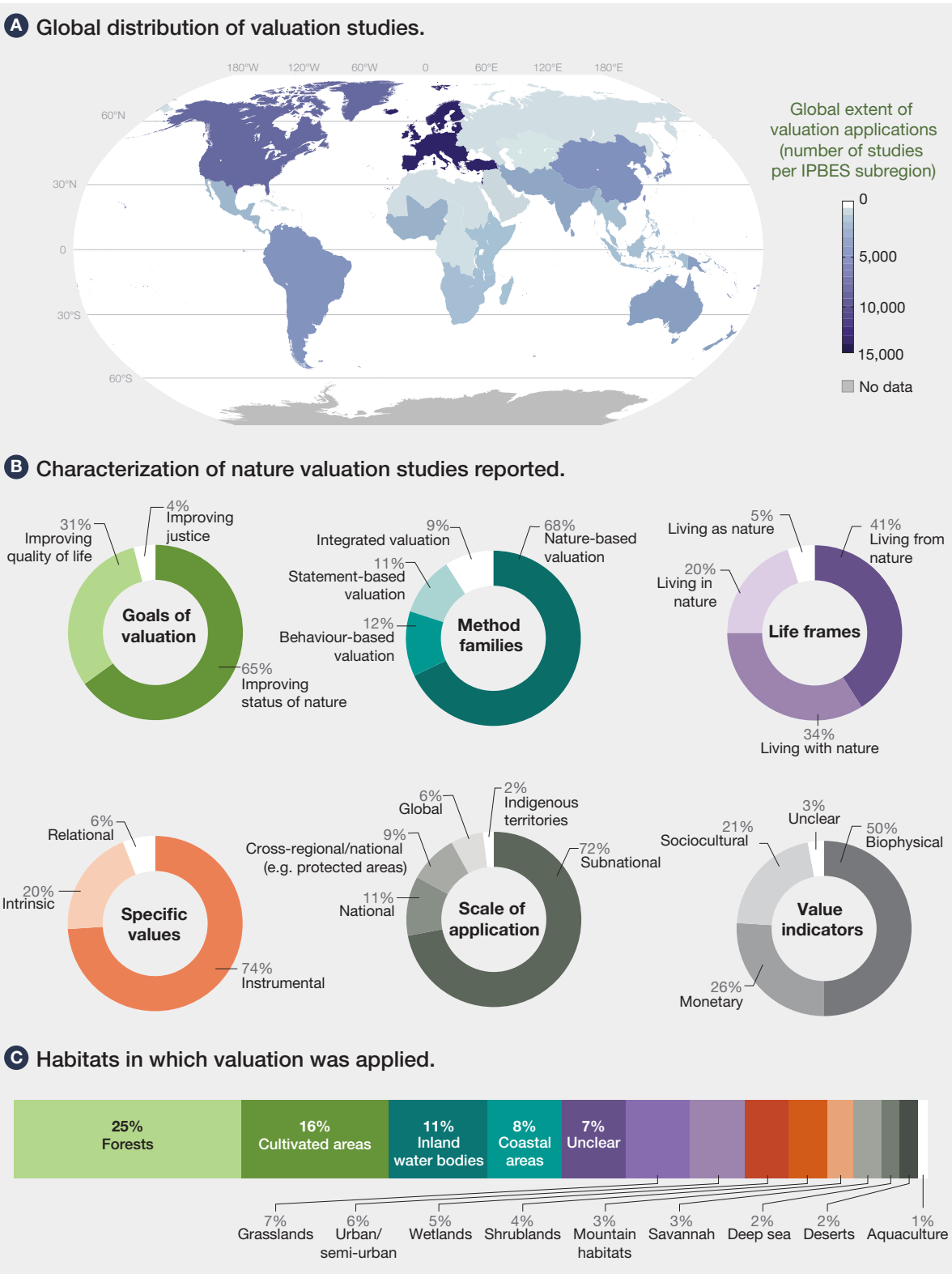


Figure SPM 3 **Global distribution and characterization of nature valuation studies reported in the scientific literature.**

Of the 79,000 studies identified, around 48,000 provided explicit geo-referenced information (depicted in the map). From these, stratified random sampling, based on relevant criteria, was conducted for studies from 2010 to 2020 across all IPBES regions. Then, valuation studies that considered the decision-making purpose were selected for in-depth review {3.2.1}, resulting in 1,163 studies that applied specific

valuation methods (used to develop the statistics in the figure). The valuation studies reviewed in depth reveal differences regarding: (i) their primary goal of valuation; (ii) the methodological approach (method family); (iii) the life frame they connect to; (iv) the specific value types they identify and assess; (v) their scale of application; (vi) the value indicators used; and (vii) their application in different ecological contexts, classified according to the IPBES units of analysis {3.2}.

Table SPM 1 **Overview of the four main valuation method families and their distinctive characteristics.**

The large portfolio of valuation methods, originating from diverse disciplines and knowledge systems (including indigenous peoples and local communities), can be grouped into four non-disciplinary method families that consist of *nature-based*, *behaviour-based*, *statement-based* and *integrated* methods. The valuation methods grouped into the different families can assess different types of values of nature and of nature's contributions to people, using different approaches, with different levels of stakeholder inclusion. Each of the methods is associated with different opportunities and limitations {3.2.3}.

	VALUATION METHOD FAMILIES				Considerations for valuation by indigenous peoples and local communities
	Nature-based valuation	**Statement-based valuation**	**Behaviour-based valuation**	**Integrated valuation**	
What is assessed? What is the source of information?	Nature, physical or ecological components of nature and nature's contributions to people	What people say or express when asked about the importance of nature and nature's contributions to people	What people do in nature, for nature, with nature, to nature or nature's contributions to people	Different outputs from one or more methods to support decision-making	Indigenous peoples and local communities gauge nature and its interdependencies with people by also gathering information from ancestors, future generations, non-human beings, the cosmos and the spiritual world. Information gathering through territory patrols, natural resources monitoring or communal assemblies can entail rituals and ceremonies undertaken by specialized traditional experts. Valuation is often a collective process that considers all members of a community (including children or those who are not visibly present), as legitimate generators of information. Understanding the richness and depth of indigenous peoples' and local communities' valuation approaches implies deconstructing disciplinary definitions of methods and concepts such as "evidence" and recognizing that integration of knowledge systems is not always possible, desirable or necessary.
Examples of methods and approaches	Biodiversity inventory, ecosystem services mapping, Delphi method, participatory mapping of ecological values	Group discussions, Q-methodology, contingent valuation, choice experiments, deliberative methods	Participant observation, travel cost method, cost-based methods, hedonic pricing, livelihood dependence, photo-series analysis	Ecosystem service valuation, cost-benefit analysis, multi-criteria decision analysis, integrated modelling, scenario building, deliberative decision methods	
How is information about values generated?	Directly measuring nature, remote sensing, consulting experts Consulting users/ experts/local communities as knowledge holders	Asking people questions (interviews, surveys), undertaking activities with people (e.g., discussions, games, art), analyzing narratives (e.g., Twitter posts)	Observing people, assessing records of people's behaviors (e.g., park visits, house purchases), assessing records of policy choices, assessing (non-) market exchanges	Synthesizing, comparing, contrasting, deliberating, consolidating or aggregating multiple values for decision-making or decision support	
"Specific values" elicited and examples of value indicators	Mainly intrinsic and instrumental values Species counts, carbon stored, ecological health indicators	Instrumental, intrinsic and relational values Subjective well-being indicators, narratives of human-nature relationships, willingness to accept compensation for setting aside land, willingness to pay for access to nature	Mostly instrumental values Time spent, share of household income, prevalence of disease, price of a hectare of land, use of indigenous plants	Instrumental, intrinsic and relational values Strength of support or objections to policy options, welfare gains or losses from projects of indigenous plants	
Type of stakeholder inclusion	Inclusive methods exist (e.g., community monitoring of biodiversity) but most methods do not include stakeholders	All methods include stakeholders to some extent (e.g., surveys) and inclusion is often integral to the methodology (e.g., deliberative valuation)	Most methods have limited or no stakeholder inclusion (e.g., analysis of market accounts), but encompass observations of diverse stakeholders	Some methods can be non-inclusive (e.g., desktop multi-criteria decision analysis), but often inclusion is key to the decision support aspect (e.g., participatory scenario building)	

	VALUATION METHOD FAMILIES				Considerations for valuation by indigenous peoples and local communities
	Nature-based valuation	**Statement-based valuation**	**Behaviour-based valuation**	**Integrated valuation**	
Examples of typical valuation "products"	Biodiversity indices, maps of priority areas for policy/ management action Improved understanding of the importance of components of nature	Ranked importance of nature's contributions to people Monetary value for protection of areas of biodiversity significance Explanations for why people value nature	Ranked importance of nature and nature's contributions to people Additional costs due to degradation (e.g., changes in time to collect fuelwood) Explanations for how people value nature	Ranked policy options Evaluation of socioeconomic and environmental impacts of policy options Improved understanding of conflicts and shared values of nature	
Limitations	Impact on people assumed but not assessed Dependence on nature is not assessed by those directly living from, living as and living with nature	Potential large variability in the reliability of statements (i.e., do people respond truthfully?) Power disparity can reduce the validity of group-based (e.g., deliberative) methods Representativeness in selection of respondents biases results	Requires conceptual and empirical understanding of the relationships between behaviour, nature and its contribution to well-being Cannot reveal in-depth understanding of motivations behind behaviour	Aggregation of values across groups of people can reduce representation of values, combining multiple value types creates incommensurability concerns	

Nature-based valuation methods are most commonly used (68 per cent), followed by statement-based, behaviour based and integrated valuation methods **(Figure SPM.3)**. Combining methods from across the method families can help better inform policy decisions, as the different methods provide complementary information on the diversity of nature's values that could not be achieved by only using methods from a single method family *(well established)* {3.2.3; 3.3.1; 3.4}. For instance, integrated modelling can help bring together information on nature's biophysical impacts (based on nature-based methods) and socioeconomic impacts (based on behaviour-based or statement-based methods) to estimate the costs and benefits of projects or policies affecting nature *(well established)* {3.2.2; 4.6}. Similarly, multi-criteria analysis allows information about the impacts of alternative policy options on stakeholders' values regarding nature to be brought together *(well established)* {3.2.2.4}. Finally, future scenario planning can identify the broad values regarding human-human and human-nature relations embedded in desired future states *(established but incomplete)* {5.2.2; 5.3.2}. All valuation methods are based on different assumptions about what characterizes the values involved, how they should be expressed and who should participate in the valuation process. Therefore, the choice of method influences the outcome (e.g., whether the focus is on instrumental, relational or intrinsic values) *(well established)* {2.4.2; 3.3.1}.

B3 Indigenous peoples and local communities undertake valuation of nature in their places and territories in accordance with their own world-views and applying locally established procedures, which can offer new perspectives to improve and advance valuation processes *(established but incomplete)*. Valuation in the context of indigenous peoples and local communities aims at supporting collective decisions regarding desirable human-nature relations by generating information about nature, enhancing collective good quality of life, transmitting and generating local ecological knowledge, and reinforcing cultural identities *(established but incomplete)* {3.2.4; 4.3 4.4; 4.5}. Valuation in these contexts often considers different sources and types of information and is undertaken by diverse expert teams that often include community members, and can imply consultation with ancestors, non-human species, landscapes and spiritual beings *(established but incomplete)* {3.2.4}. Examples of valuation approaches are patrols of communal territories conducted to monitor attributes of nature, such as soil quality, pasture conditions, or wildlife abundance. Ultimately, findings from valuation are used to make decisions for the collective, such as where to migrate, when to undertake farming activities and what hunting quotas to set *(established but incomplete)* {3.2.4}.

Valuation by indigenous peoples and local communities is often accompanied by a set of protocols and procedures

that are in adherence with their world-views and specific to local contexts *(established but incomplete)* {3.2.4}. Applying western science concepts and procedures to describe and characterize valuation undertaken by indigenous peoples and local communities risks misrepresenting their world-views and valuation practices, since specific methods cannot be decoupled from their communal world-views, practices and traditions *(well established)* {3.2.4}. Indigenous perspectives offer opportunities to learn alternative forms of valuation, improve valuation practices, and advance the development of intercultural methods that are based on ethical principles and guidelines *(well established)* {3.1.1; 3.4.4} such as co-producing valuation and undertaking it with the free, prior and informed consent and full involvement of indigenous peoples and local communities (*well established*) {3.3.1}.

B4 Different valuation methods and approaches can assess different types of values of nature; however, challenges emerge when comparing different values to inform decision-making *(well established)*.
Most valuation studies (76 per cent of the 1,163 valuation studies reviewed in depth) focus on more than one type of value related to different aspects of nature, its contributions to people and good quality of life. Less than 10 per cent address more than one life frame of nature's values (i.e., living *from, with, in* and *as* nature) *(well established)* {3.3.1}. Yet, most valuation studies (77 per cent) use one main method or a combination of approaches within the same method family *(well established)* {3.3.1}. The majority (56 per cent) of valuations do not attempt to bring different values together, but instead use distinct biophysical, monetary and sociocultural indicators. A primary objective of valuation is to allow different but compatible values to be comparable, e.g., to enable prioritization in decision-making. Almost half of the valuation studies that do bring different values together apply methods allowing values to be directly compared *(well established)* {3.3.1}; the other half compares bundles of values, or uses relative weights based on participants' or valuation experts' rankings or deliberation *(well established)* {3.3.1}. Less than 1 per cent of valuation studies keep values separate (i.e., treat them in parallel in a deliberative process) (*well established*) {3.3.1}.

Increased plurality in valuation practice currently relies on the use of a wide variety and combination of methods to elicit different types of values of nature and different approaches to dealing with issues of value comparability, compatibility, and representativeness *(well established)* {3.2.3; 3.3.1; 3.3.4; 3.4.5}.

B5 While meaningful stakeholder participation in valuation is needed to ensure appropriate consideration of their values in decisions, participation at every step of valuation is only found in 1 per cent of valuation studies reviewed *(well established)*.
Participation of stakeholders in valuation helps to gather information, build trust, and achieve procedural justice. Some stakeholder involvement is reported in 44 per cent of valuation studies *(well established)* {3.2.1}. Participatory valuation approaches are increasingly adopted and implemented across all method families *(well established)* {3.2.1}. Participation most frequently entails providing data *(well established)* {3.2.1}. Only 2 per cent of studies consult stakeholders on findings and 1 per cent involve them in every step of the valuation process *(well established)* {3.2.1}. Approximately half of the studies that engaged with stakeholders report on the diversity of interests at play and on how social representation is attained. Even though valuations have become more participatory over time, the engagement of stakeholders is mostly basic, including stakeholders as data and information providers. Higher levels of participation are found, and are particularly relevant for indigenous peoples and local communities *(well established)* {3.5}.

Several strategies can enhance stakeholder inclusion in valuation, including engaging participants in their local languages (6 per cent of valuation studies), communicating through diverse media (e.g., verbal and written forms) (3 per cent) and managing group composition and size (1 per cent) *(well established)* {3.3.2}. When potential representation biases are adequately addressed, participatory approaches generally enhance stakeholders' perception of the legitimacy of the valuation process, particularly where minority views are included *(well established)* {3.2.1; 3.2.2; 4.5.3}.

B6 A key challenge when eliciting values at higher social scales is identifying and addressing ways in which access to nature's contributions is inequitably distributed across individuals, groups and generations (well established).
Valuations mostly aim to obtain values at higher social scales beyond the values of individuals and groups (e.g., landscape, country) (*well established*) {3.3.2.3}. A key challenge in the process of aggregation is how to deal with issues relating to the just distribution of nature's contributions to people *(well established)* {3.3.2.3; 4.5.5.2}. The aggregation process can address this problem by using income equity weighting (i.e., applying higher weightings to the values of those in lower income groups), and by adjusting time discounting (i.e., using lower discount rates to place relatively more weight on policy impacts on future generations) (*well established*) {3.3.2}. The way these income weights and time discount rates are applied, for instance in cost-benefit analysis, has a significant impact on policy and project evaluation results, and thus remains a highly contested issue *(well established)* {3.3.2.3}. Most valuation studies focus on people living today and do not consider intergenerational equity *(well established)* {3.3.1.1; 3.3.2.3}. Whilst guidelines are available to consider equity when aggregating impacts on individuals and social groups with diverse socioeconomic conditions, these are rarely used in valuation (5 per cent of studies reviewed) *(well established)* {3.3.2.3}.

Values at higher social scales can also be elicited using deliberative approaches to form shared values *(well established)* {2.2.3.3; 2.4.2.1; 3.2.2.4; 5.2.2.1}. Deliberative approaches can contribute to the recognition of diverse values, identities and knowledge (recognition justice), learning, and the inclusion of diverse voices in decision-making processes (procedural justice) *(well established)* {5.3.2; 5.3.3}. Well-facilitated deliberative approaches can help manage conflicts between stakeholders who may hold unaligned or conflicting values *(well established)* {2.4.2.1; 2.4.2.2; 2.5.1}. Yet, deliberative approaches are sensitive to which individuals or groups participate and to power imbalances among participants *(well established)* {2.4.2; 3.2.2.4}.

B7 Standardization procedures in valuation can help increase the uptake of ecosystem accounting into national policies, with due consideration to the ongoing challenges of implementation in decision-making, linking accounting to diverse valuation perspectives and the challenges of measurement and valuation *(established but incomplete)*.
National ecosystem accounting aims to assess ecosystem services at the national level and to organize the associated data into an agreed statistical framework. This requires employing standardized methods that allow comparisons across countries, sectors, and through time. The System of Environmental-Economic Accounting – Ecosystem Accounting uses biophysical and monetary indicators ("exchange values", i.e., equivalent to the value of goods and services exchanged in markets) to capture key instrumental values of nature. It provides an international statistical standard to guide the integration of ecosystem extent, condition and physical ecosystem service accounts into national accounts (*well established*) {4.6}. Standardizing valuation procedures can help the development of national ecosystem accounting, and its uptake in national policies. Ongoing challenges in advancing implementation include: (i) the need to move beyond the compilation of accounts to the use of accounting data in applications and decision-making processes; (ii) the need to build links to the discussions of diverse value perspectives; and (iii) the need for further research on several aspects of measurement and valuation, especially the exchange values of ecosystem services (*established but incomplete*) {3.2.2; 3.3.4.1; 4.6.4.2}.

B8 Valuation processes can follow five iterative steps to address the trade-offs between the relevance, robustness and resource requirements of valuation methods *(established but incomplete)*.
Clarifying the purpose and scope of valuation helps identify the values of nature at stake and ensure the *relevance* of the valuation for decision-making. As the choice of valuation method influences the outcome, relevance entails ensuring that different values can be considered. Current valuation practice tends to only elicit those values that can easily be made visible with readily available methods *(established but incomplete)* {3.3.1; 3.4.3}. Valuation also needs to be *robust* in order to provide useful information for decision-making. Robust use of methods involves providing reliable and theoretically consistent evidence following a transparent and socially legitimate value elicitation process *(well established)* {3.3.2}. Since valuation requires employing *resources* (e.g., time, financial, technical and human resources), their availability determines the feasibility of applying any given valuation method *(established but incomplete)* {3.3.3}. Addressing the trade-offs between relevance, robustness and resources can be done by following five iterative steps adjusting valuation to the specific decision-making context **(Figure SPM.4)**: (i) invest in a legitimate process *(well established)* {3.4.2; 2.4.2}; (ii) define the purpose and intended use of the valuation outputs *(well established)* {3.4.3; 5.2}; (iii) establish the boundaries of the valuation scope *(well established)* {3.4.5; 5.2}; (iv) choose and apply the valuation methods based on the former steps *(well established)* {5.2; 3.4.5; 2.4.2}; and (v) communicate valuation results, validity, limitations and risks *(well established)* {3.4.6; 4.2}.

B9 Choosing appropriate valuation methods involves identifying their comparative strengths and weaknesses, particularly by taking into account their relevance, robustness and resource requirements *(well established)*.
Some valuation methods provide highly specific valuation outputs (e.g., biodiversity mapping), while others focus on integrating different types of information about values (e.g., multi-criteria decisions-based methods) **(Table SPM.2)**. Highly specialized methods in isolation cannot elicit diverse values, but can be essential for including critical value information with sufficient detail into decision-making processes *(established but incomplete)* {3.3.4}. Among economic methods, revealed preference methods (in the behaviour-based method family) for example, provide reliable information on values but often only elicit those from a specific group of stakeholders, omit many types of values and are resource intensive, especially in contexts with data scarcity. In contrast, stated preference methods (in the statement-based method family) are generally less reliable and less resource intensive, but are significantly more adaptable to a wide range of stakeholders, value types and decision-making contexts *(well established)* {3.2.2; 3.3.4}.

B10 Different economic nature valuation initiatives can complement one another to inform policy decisions *(well established)*.
Economic valuation initiatives have been developed to guide policy but are still in the process of being implemented. The Economics of Ecosystems and Biodiversity (TEEB) provides guidance and examples, mainly at the local level, of how the economic valuation of market and non-market instrumental values of biodiversity (e.g., as economic asset, ecosystem

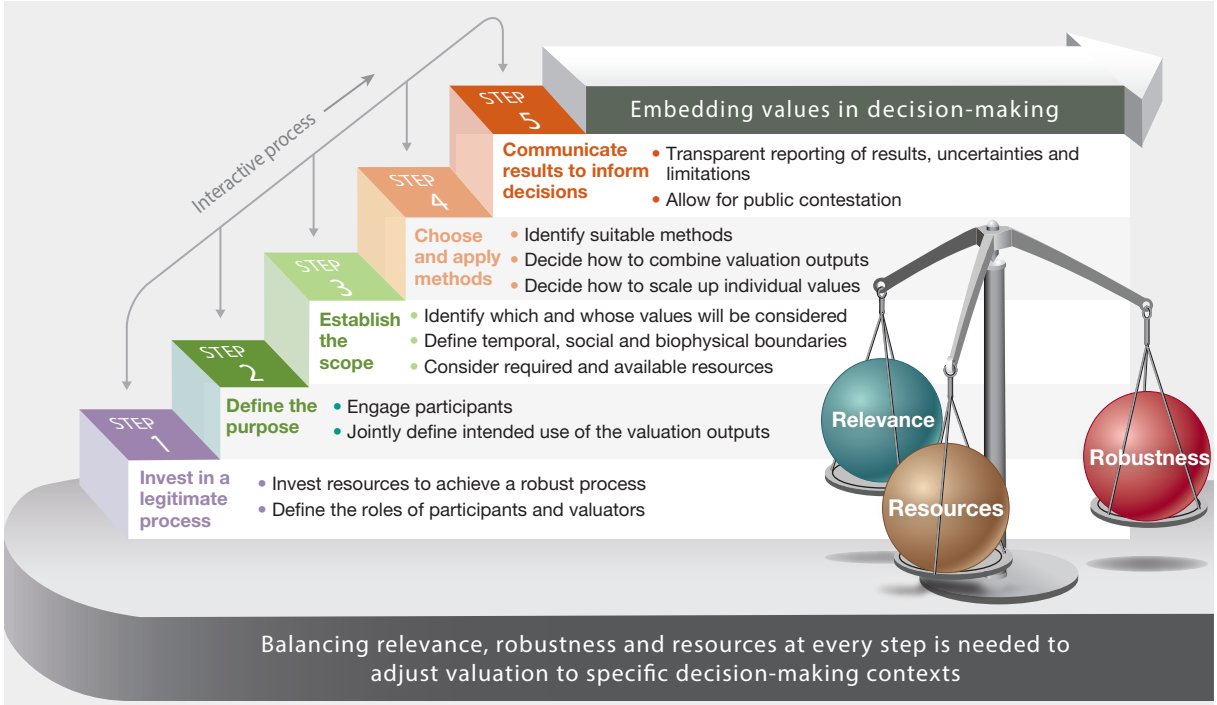


Figure SPM 4 **Valuation processes can follow five iterative steps to enhance the quality of valuation outputs for decision-making.**

At each step, choices need to be made considering the trade-offs in valuation regarding relevance (ensuring that different values can be considered), robustness (reliable and theoretically consistent evidence following a transparent, and socially inclusive and legitimate value elicitation process), and resource requirements (time, financial, technical and human resources) {3.4.1}.

service or benefit flow) can support environmental policies across sectors (e.g., agriculture, forestry, fisheries)[8] *(well established)* {3.2.2; 6.2.3}. The System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA–EA)[9] provides internationally recognized statistical standards and principles that integrate the physical extent and condition of ecosystems, ecosystem services and their values into national accounting systems (*well established)* {3.2.2.4; 4.6.4}. The "inclusive/comprehensive wealth" proposals, highlighted in the Dasgupta Review,[10] go beyond standard macroeconomic indicators like gross domestic product, providing comprehensive indicators of sustainable economic development *(well established)* {2.2.4; 3.3.4; 5.5.2}.

These economic initiatives each have their challenges, but can potentially complement each other's strengths and weaknesses **(Table SPM.2)**. Regarding *relevance*, TEEB relies mostly on instrumental values of nature, expressed using the "total economic value" framing. SEEA – EA provides guidance for spatially explicit ecosystem accounting that considers the values of ecosystem services and ecosystem assets limited to "exchange values" in order to make them compatible with national accounts *(well established)* {3.2.2.4; 4.6.4}. Inclusive/comprehensive wealth approaches focus on valuing nature as an asset, combined with other capital assets (e.g., human health, technology and infrastructure) to provide welfare indicators that consider their aggregate long-term changes *(well established)* {2.2.4; 3.3.4; 5.5.2}. Both TEEB and SEEA – EA can draw on spatial mapping and statistics to prioritize policy interventions where environmental degradation has the most severe impacts *(well established)* {3.2.2; 4.6.4}. Regarding *robustness*, SEEA – EA applies United Nations statistical standards for biophysical accounts and internationally accepted statistical principles for monetary accounts. However, it is yet to be implemented in many countries. Inclusive/comprehensive wealth approaches have strong theoretical foundations, but their implementation is impeded in practice by data availability issues *(established but incomplete)* {3.3.4}. Regarding *resources*, SEEA – EA and inclusive/comprehensive wealth approaches have relatively high set up costs, given their high technical and data requirements. However, once capacity and infrastructure are developed, their resource needs may decrease significantly, allowing for their continuous implementation *(established but incomplete)* {3.3.4; 4.6.4}.

8. United Nations Environment Programme, *Mainstreaming the economics of nature: a synthesis of the approach, conclusions and recommendations of TEEB* (Nairobi, 2010).
9. *System of Environmental-Economic Accounting 2012: Central Framework* (United Nations publication, 2014).
10. P. Dasgupta, *The Economics of Biodiversity: The Dasgupta Review* (London, HM Treasury, 2021).

Table SPM 2 **Valuation methods face trade-offs in terms of their relevance, robustness, and resource requirements.**

Relevance involves both the capacity of methods to elicit a diversity of values of nature, including specific and broad values, and their versatility in terms of adapting to different socialecological contexts. Robust methods provide reliable and fair representations of nature's values {3.3.2}. Resource requirements for valuation need to balance the costs involved in building up initial capacity (including technical and data sources) and the time and financial costs involved in applying the method. Methods that perform relatively well, based on a synthesis of the relevance, robustness and resources characteristics of valuation methods, are denoted with larger bubbles {3.3.4} (panel A). Similar trade-offs point towards complementarities between different economic valuation approaches to embed the values of nature in policymaking (panel B). Such valuation approaches include The Economics of Ecosystems and Biodiversity, the System of EnvironmentalEconomic Accounting – Ecosystem Accounting and "inclusive/comprehensive wealth" approaches {3.3.4}.

Balancing relevance, robustness and resources

Possibility to elicit values in diverse contexts
Higher ⟷ Lower

Robustness of the method
Higher ⟷ Lower

Affordability and ease of use
Higher ⟷ Lower

✓ Well established

Established but incomplete

A Valuation methods.

Examples of valuation methods		Relevance: Ability to elicit of diverse values in multiple social-ecological contexts		Robustness: Ability to ensure reliable (accurate and valid) and fair representation of stakeholders		Resources: Affordability and ease of use		Level of confidence
		Diverse values	Diverse contexts	Reliability	Representation	Ease of implementation	Ease of operation	
Nature-based valuation	Ecosystem services mapping							✓
	Biodiversity mapping							✓
Statement-based valuation	Stated preferences							✓
	Q method							~
Behaviour-based valuation	Revealed preference							✓
	Livelihood assessment							✓
Integrated valuation	Integrated modelling							~
	Participatory mapping							✓
Decision-making tools based on integration of values	Cost-benefit analysis							✓
	Multi-criteria decision assessment							✓
	Deliberative integration methods							~
Methods that do not elicit value information	Benefit transfer							~

Examples of valuation methods		Relevance: Ability to elicit of diverse values in multiple social-ecological contexts		Robustness: Ability to ensure reliable (accurate and valid) and fair representation of stakeholders		Resources: Affordability and ease of use		Level of confidence
		Diverse values	Diverse contexts	Reliability	Representation	Ease of implementation	Ease of operation	
Examples of valuation by indigenous peoples and local communities	Forest health monitoring (forest walks, territory patrols)	Capable individuals (i.e., human resources to conduct validation) are entrusted (i.e., assurance of robustness) to assess forest recovery using communally accepted indicators relevant for multiple uses by the community (i.e., representation and diverse values).						✓
	Community assemblies for deliberations	Community meetings to gather all members' opinions (including women's and children's) about nature (i.e., representation/robustness, relevance} and to jointly interpret the opinions and deliberate on how to move forward (i.e., capacities to conduct valuation). Community members are trusted to speak based on their knowledge and lived experiences (i.e., reliability).						✓

B Economic valuation approaches to embed the values of nature in policymaking.

Economic approaches to embed values in economic decisions	Relevance: Ability to elicit of diverse values in multiple social-ecological contexts		Robustness: Ability to ensure reliable (accurate and valid) and fair representation of stakeholders		Resources: Affordability and ease of use		Level of confidence
	Diverse values	Diverse contexts	Reliability	Representation	Ease of implementation	Ease of operation	
The Economics of Ecosystems and Biodiversity (TEEB)							✓
United Nations System of Environmental Economic Accounting – Ecosystem Accounting (SEEA – EA)							✓
Inclusive/comprehensive wealth approaches							~

C. Leveraging the diverse values of nature for transformative change towards sustainability.

C1 **Transformative change towards sustainability can be facilitated through policies designed to incorporate sustainability-aligned values into established social conventions, norms and legal rules that shape human-nature relations *(well established)*.** The current dependency of political and economic decisions on a narrow set of nature's diverse values underpins the global biodiversity crisis. Incorporating a wider set of values and perspectives into policy design and implementation can address the negative effects of people's actions on nature *(well established)* {1.3; 4.3, 4.7; 6.2.3; 6.5}. However, reverting human impact on biodiversity would require a more systemic, transformative change (i.e., "a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values"[11]). Such change can be supported by creating conditions that nurture sustainability-aligned values (e.g., mobilizing values of stewardship through tenure reforms that reconnect indigenous peoples and local communities to their territories), as well as by moderating those values that underpin biodiversity loss and ecosystem degradation *(well established)* {5.2.2; 5.3.2;

11. IPBES (2019): Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Brondizio, E.S., Settele, J., Díaz, S., Ngo, H.T. (eds). IPBES secretariat, Bonn, Germany, 1144 pages. ISBN: 978-3-947851-20-1.

5.3.3}. These conditions involve significant transformations of established norms and legal rules that currently promote a restricted set of instrumental values associated with short-term economic profits and political gains. Such transformative change is more likely to occur when institutional change is widely supported by and arises from local levels *(well established)* {2.4.2; 4.7; 5.4.2}.

C2 Valuation can support policymaking across the different stages of the policy cycle *(well established)*. Valuation can support policymaking across the different stages of the policy cycle, especially when it considers diverse knowledge systems *(well established)* {3.2.1.2; 4.6} **(Figure SPM.5)**. It can be used in policymaking to: (i) help *set agendas* and support commitment to agreed goals; (ii) provide technical assistance for *policy formulation* and design, such as agreeing on the alternatives under consideration or designing economic incentives; (iii) aid *policy adoption* and agreements about the means of implementation, such as assessing costeffectiveness of different alternatives for policy action; (iv) monitor to support *in-course adjustments to implementation* measures or justification for continued budget allocations; and (v) undertake retrospective *policy evaluation.* The five steps of valuation **(Figure SPM.4)** can be applied at each stage in the policy cycle to increase the likelihood of policy uptake.

C3 Despite the significant increase in valuation studies over the last 30 years, less than 5 per cent report the uptake of valuation in decision-making *(well established)*. Over the past few decades, a wide range of valuation methods and approaches have been developed, refined and tested in different social-ecological contexts. A majority of countries have not made progress at a rate that would have allowed achievement of Aichi Target 2 by 2020 of integrating biodiversity values into strategies, planning process and accounting, as reported in their national reports to the Convention on Biological Diversity *(well established)* {2.1.2; 4.6.4.1}. Only a very small share of peer-reviewed studies actually report uptake by decision makers, including Governments *(well established)* {4.6}. Valuation studies with decision support or policy design purposes are more likely to document valuation uptake than those with informative purposes **(Figure SPM.5)** *(well established)* {4.6.3}. Economic-based valuations are not taken up significantly more often than valuations using non-monetary indicators *(well established)* {4.6.3}. Key barriers inhibiting the uptake of valuation in public policy decisions include limited reliability of studies for decision-making *(well established)* {3.3.2}, limited technical capacity and institutional gaps that undermine the ability to monitor and assess the social, economic and environmental benefits provided by nature, as well as overlooking values in decision-making *(well established)* {4.5; 4.6.2; 4.7}.

C4 More equitable and sustainable policy outcomes are more likely to be achieved when decision-making processes recognize and balance the representation of the diverse values of nature and address social and economic power asymmetries among actors *(established but incomplete)*. Valuation studies often present a diversity of stakeholder perspectives based on aspects such as age, gender, position and power relations (43 per cent of the 1,163 valuation studies reviewed in depth) and are able to characterize various broad and specific values associated with different life frames (*well established*) {3.3.2; 3.2.4}. However, only a small fraction of valuation studies (0.6 per cent) explicitly report on measures to account for power asymmetries within the valuation process itself *(well established)* {3.3.2}. Where decision-making occurs in the context of highly asymmetrical power relations, recognizing the marginalization of certain world-views and knowledge systems and respecting values among indigenous peoples and local communities are associated with increased forest cover and species populations, enhanced delivery of ecosystem services, and improved livelihoods *(well established)* {2.4.1; 4.4, 4.5.2; 4.5.3; 4.5.4}. Improving information about the values of nature as well as strengthening and developing different capacities at all levels of interventions are key to balancing power imbalances, improving the outcomes of negotiations, and achieving more just and sustainable results *(well established)* {6.5.1}.

Power asymmetries are often found between those who articulate instrumental values for and against large development and infrastructure projects. For example, dams are often proposed for their market-based instrumental values (including electricity to urban consumers, irrigation water for agriculture, and jobs), while the relational and instrumental values of those directly affected by the project (e.g., loss of farming and fishing livelihoods and ways of life) are often excluded due to power asymmetries. Social movements have sought to shift this imbalance through resistance, litigation and protest (*well-established)* {4.5.5}. Addressing these power asymmetries by recognizing the diversity of values through participatory assessments can lead to more equitable distribution of project costs and benefits *(well established)* {4.5.5}.

In biodiversity conservation, community involvement that allows for the prioritization of local values leads to social outcomes being perceived as fairer, often enhancing programme sustainability and consequently socialecological outcomes *(well established)* {4.5.2}. Here again power asymmetries among local stakeholders can be addressed to improve decision outcomes, such as through co-management of protected areas and co-design of payments for ecosystem services programmes to protect forests *(established but incomplete)* {4.5.2; 4.5.3}. Whose values are included in conservation decisions is a key consideration since it influences the outcomes of decisions; for example,

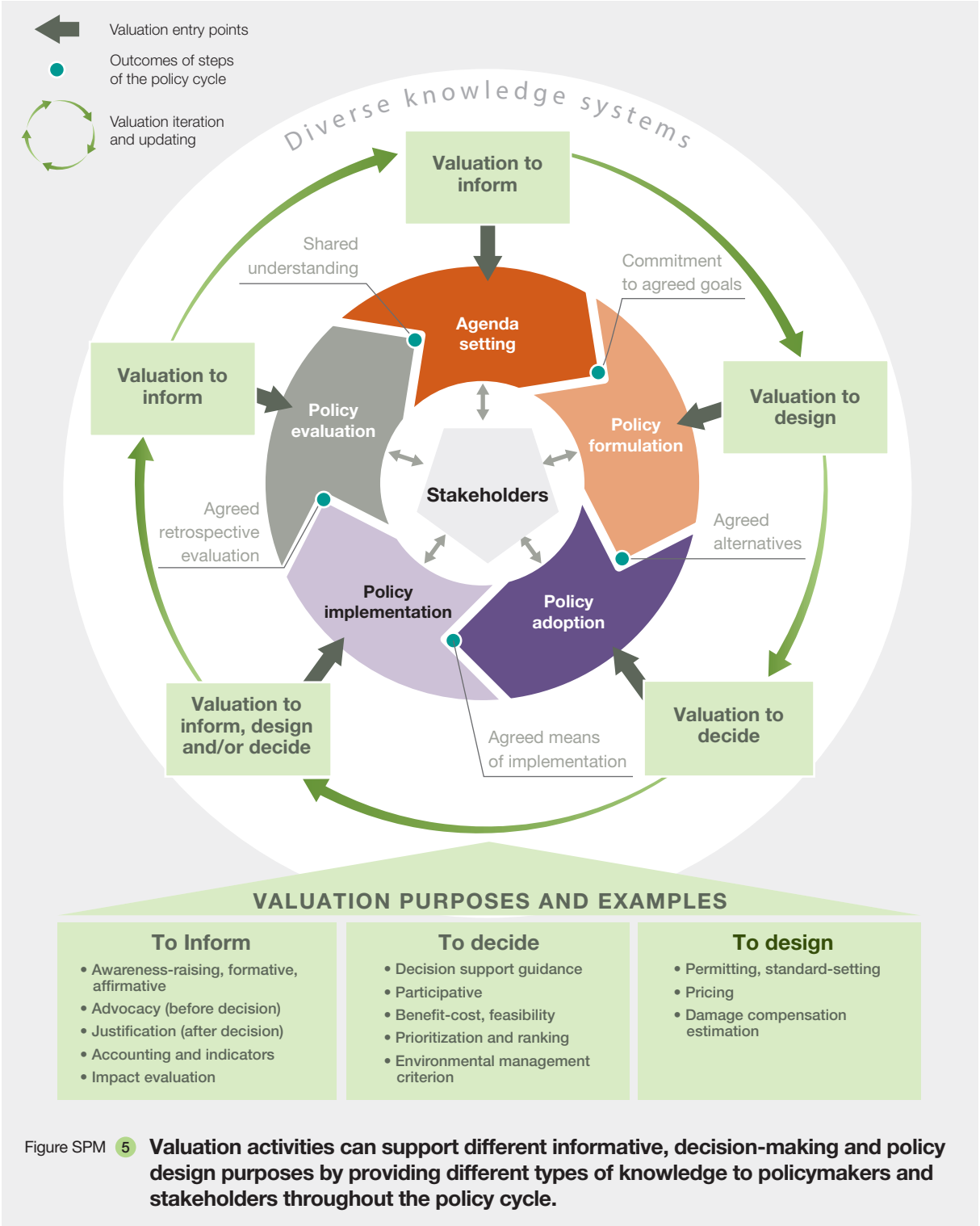


Figure SPM 5 **Valuation activities can support different informative, decision-making and policy design purposes by providing different types of knowledge to policymakers and stakeholders throughout the policy cycle.**

relational and instrumental values held by indigenous peoples and local communities are often underrepresented and enter the decision process late in protected area decisions mostly driven by intrinsic values, generally resulting in mistrust and less effective conservation *(well established)* {4.5.2}. Payments for ecosystem service programmes with substantive community engagement in defining the land management problem or that adapt to local demands over time are better able to align values among diverse stakeholders and achieve better conservation and social outcomes *(established but incomplete)* {4.5.3}.

C5 Recognizing and respecting indigenous and local knowledge and their associated diversity of

values is necessary to achieve outcomes that are respectful of different ways of living *(established but incomplete)*.
There is increasing recognition of the need to bridge between knowledge systems, including those of indigenous peoples and local communities, to support policies related to, for example, development, biodiversity conservation, sustainable use of biodiversity, and climate change mitigation *(well established)* {2.2.3}. Better understanding of the indigenous and local knowledge and its associated diversity of values requires going beyond dominant epistemologies and world-views, including efforts to decolonize perspectives in order to recognize other ways of seeing, knowing and doing, as those that belong to indigenous peoples and local communities *(well established)* {3.2.1, 3.2.4.1; 4.4.2} Considering place-based values in decision-making can lead to more equitable and sustainable outcomes *(well established)* {2.2.3; 3.2.4; 4.4.2; 4.4.3; 4.4.4; 4.5.2; 4.5.3; 4.5.4; 4.6.4; 4.6.7}. For example, in agroecosystems, recognizing and giving credence to the knowledge and values of smallholders, including women, are key to co-designing initiatives that ensure food security and the sustainable use and conservation of agrobiodiversity by farming communities *(established but incomplete)* {2.2.1; 4.4.4}.

C6 Ignoring, excluding or marginalizing local values often leads to socio-environmental conflicts linked to value clashes, especially in the context of power asymmetries, which undermine the effectiveness of environmental policies *(established but incomplete).*
Socio-environmental conflicts often result from decisions that exclude some groups' values, especially those of indigenous peoples and local communities who can be directly connected with and dependent on nature and who bear a disproportionate burden from changes in rights to access or use of nature *(well established)* {4.5.2; 4.5.3; 4.5.5}. For example, many infrastructure and development projects, such as mining, have led to prolonged conflicts between indigenous peoples and local communities and external actors. Such cases often result in court battles and other forms of protest against perceived environmental injustices; these battles and protests threaten local values through degradation or loss of locally valued ecosystems *(well established)* {2.2.3.2; 2.4.2; 4.5.5}.

Ignoring or marginalizing local values in the design and management of conservation activities, including protected areas and payments for ecosystem service programmes, can also leave a legacy of mistrust or resentment that is difficult to repair and can provoke local protest and even sabotage, jeopardising conservation outcomes over time *(established but incomplete)* {4.5.2; 4.5.3}. Conflicts can be avoided or more easily resolved when policy goals are aligned with local instrumental and relational values *(well established)* {4.5.2}. However, when the values of different actors or groups clash, conflicts may be unavoidable. In such cases, dialogue and transparent deliberative approaches can help make explicit the values underlying the conflict and through consideration of the different values actors may be able to reconcile their values and develop a shared vision of what a successful programme might look like (*established but incomplete)* {3.2.1; 5.5.6}.

C7 Pathways towards sustainability and justice hinge on the inclusion of a diverse range of nature's values *(established but incomplete).*
Future scenario planning and development studies deal with values in different ways. Out of 460 scenarios reviewed, 53 per cent of them explicitly articulate values, especially when co-developed with stakeholders, 42 per cent of them mention values but do not assess them explicitly, and 53 per cent of them perform some kind of valuation without reflecting on underpinning values *(well established)* {5.2.2}. The majority of scenario studies are driven by instrumental values (94 per cent), either solely (60 per cent) or in combination with other types of values (34 per cent) *(well established)* {5.2.2}.

Scenarios can be grouped according to their potential to achieve the Sustainable Development Goals and to the relative importance of broad and specific instrumental, relational and intrinsic values in those scenarios. The types of scenarios that are most likely to achieve sustainable and just futures (i.e., *global sustainable development* and *regional sustainability scenarios*) typically have a strong societal focus, have high regard for both the values of nature's material and non-material contributions to people, consider a range of instrumental, relational and intrinsic values, and emphasize the diversity of life choices and social-ecological resilience *(established but incomplete)* {5.2.2}. Those types of scenarios that are focused on material accumulation, economic growth and individual benefit and only emphasize a narrow range of instrumental values (i.e., *inequality*, *regional competition, breakdown, business as usual,* and *economic optimism* scenarios*)* incorporate only a narrow suite of Sustainable Development Goals and thus have the least sustainability potential *(well established*) {2.2.3; 2.4.2; 4.3; 5.2.2; 5.5.6}.

Various pathways can contribute to achieving just and sustainable futures, including, but not limited to, the "green economy", "degrowth", "Earth stewardship", and "nature protection" and other pathways arising from diverse world-views and knowledge systems (e.g., living well and other philosophies of good living) **(Box SPM.3)**. All of these sustainability pathways are associated with certain sustainability-aligned values and seek a more diverse valuation of nature as a foundation for reconciling social, economic and ecological dimensions *(well established)* {2.2.3; 5.5}. No single path is likely to be universally accepted as superior, and there is no feasible agenda to resolve all conflicts or trade-offs among these pathways. Hence, constructive dialogue between these and other possible pathways, based on transparency and recognition of the diversity of values underlying their different positions,

would be crucial to achieve transformative change towards sustainability *(established but incomplete)* {5.3.3; 5.5; 6.3.3}.

C8 Mobilizing sustainability-aligned values involves empowering civil society and changing societal structures and institutions *(well established)*. Holding sustainability-aligned values is necessary but insufficient to ensure pro-environmental behaviour. Besides motivation, people also need the capabilities and opportunities to act. Therefore, the integration of diverse values into decision-making or the mobilization of existing sustainability-aligned values can be supported by governance structures that create opportunities to give voice to and act upon these values, including public deliberation and citizen engagement *(well established)* {5.3.4}.

Mobilizing sustainability-aligned values implies empowering and informing civil society through appropriate societal structures and institutions. However, consumers may be impeded from acting upon their proenvironmental values due to market pricing, lack of available purchase options, or competing social norms favouring unsustainable consumption options *(well established)* {5.3.4}. Likewise, producers may be constrained by sectoral policies, market prices, the need to maximize short-term shareholder profits or to contribute to predominant sociopolitical goals like economic growth *(well established)* {2.4.2; 4.5.4}. To overcome such value-action barriers, international cooperation can be mobilized and institutions can be designed or transformed, as appropriate, to support sustainable and fair global value chains, at all levels *(established but incomplete)* {4.5.4}.

Creating public and private standards and certification schemes associated with single commodity value chain initiatives has had limited achievement of intended social and ecological objectives, but there is some evidence that they are changing the behaviour of the private sector (e.g., agricultural businesses) and leading to voluntary certification schemes that go beyond single commodities *(established but incomplete)* {4.3.3; 4.5.4}. However, if not designed in line with relevant international rules and implemented with local input, these programmes may leave smallholders behind, with undesired social, environmental, and economic consequences *(established but incomplete)* {4.5.4}. Furthermore, there are efforts to reform institutions associated with biodiversity conservation that allow indigenous peoples and local communities to develop their own conservation models *(established but incomplete)* {5.4.2; 5.5.4}.

C9 Transformative change towards more sustainable and just futures relies on a combination of actions that target different values-centred leverage points, in particular: (i) undertaking valuation that recognizes the

Box SPM 3 Pathways that contribute to just and sustainable futures prioritize distinct underlying values of nature.

A pathway to transformation is a strategy for getting to a desired future based on a recognizable body of sustainability thinking and practice {5.5.1}. Among the many potential pathways to more sustainable futures, for example, the "green economy" pathway emphasizes the primacy of reform of economic institutions, technologies and performance metrics {5.5.2}.The "degrowth" pathway emphasizes strategies that reduce the material throughput of society, protecting human well-being through equitable distribution of material wealth rather than growth, reducing energy and resource consumption in the most industrialized countries as a means to achieve inter- and intra-generational equity and good quality of life for all {5.5.3}. The "Earth stewardship" pathway emphasizes local sovereignty and agrarian reform, solidarity, and the promotion of biocultural practices {5.5.4}. The "nature protection" pathway emphasizes protecting biodiversity for its own sake and expanding protected area networks {5.5.5}. These pathways pay attention to some form of social justice, especially between generations. The nature protection pathway considers justice as a separate goal to saving biodiversity, whilst the other pathways see justice and sustainability as interdependent. These four pathways emphasize different social justice principles, such as the utilitarian approach to maximising aggregated benefits (green economy), consumption thresholds (degrowth), strengthening rights and empowerment (Earth stewardship) and safeguarding option values (nature protection) {5.5.2; 5.5.3; 5.5.4; 5.5.5.}.

All the pathways reveal diverse ideas about what constitute sustainability-aligned values {5.5.1; 5.5.6}. The green economy is underpinned by prioritization of nature's instrumental values, emphasizing the role of nature as an asset that supports people's good quality of life {5.5.2}. Degrowth is underpinned by values of sufficiency and egalitarianism for shaping people's balance with nature {5.5.3}. Earth stewardship is underpinned by relational values linked to biocultural diversity, alongside broad values like unity and reciprocity among people and between people and nature {2.2.3; 5.5.4; 6.3.3}. Nature protection is underpinned by intrinsic values of nature, particularly concerned with the inadequacies of an instrumental basis for protection {5.5.5} **(Figure SPM.6)**. There are many other pathways referring to other world-views and knowledge systems found throughout the world, including those based on the fulfilment of a collective good quality of life (mostly based on non-anthropocentric world-views) **(Box SPM.6)** {5.5.4; 2.2.1; 2.2.3}.

Box SPM 3

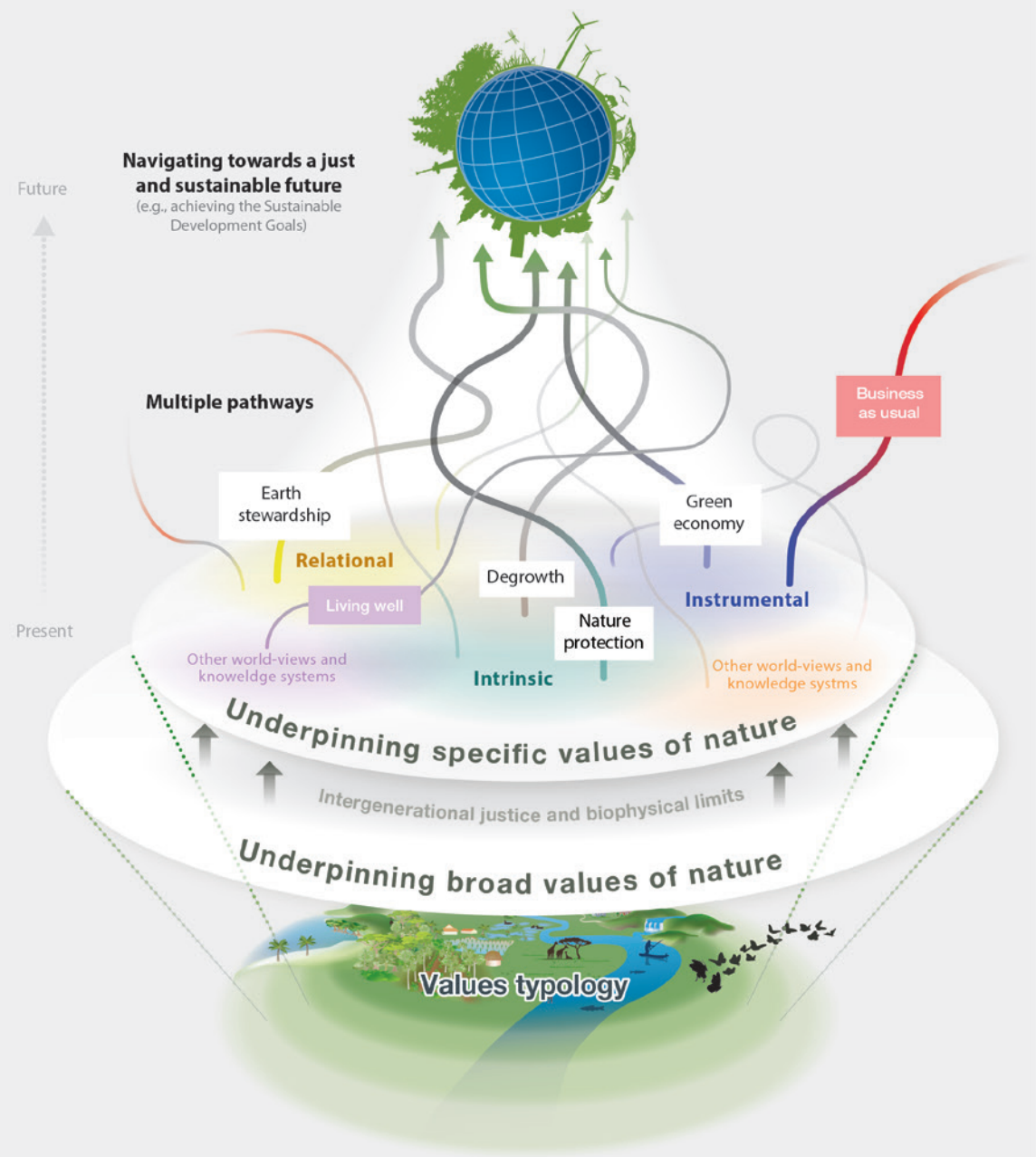


Figure SPM 6 **The diversity of values of nature underpins multiple pathways towards sustainability.**

There are alternative pathways to achieving the Sustainable Development Goals, supported by different coalitions of stakeholders, responding to different contexts and needs, and being adjusted as they are operationalized. For example, a green economy pathway currently has the greatest traction among many business and government stakeholders, but this is contested by alternative pathways, supported by coalitions that emphasize, for example, degrowth, Earth stewardship, and nature protection. Alternative pathways are underpinned by different broad and specific values of nature. There are many pathways related to other world-views and knowledge systems. Some broad values are shared by all pathways, including the imperative to do justice to future generations, and lead to synergies among pathways. Yet, other broad values are contested and can lead to conflicts across pathways, for example, between those which emphasize economic growth as linked to prosperity versus those that value sufficiency and a more relational basis for living well {5.5}. Although living well is an important concept, the evidence used to produce this figure did not review this pathway in particular.

diverse values of nature; (ii) embedding valuation into decision-making; (iii) reforming policies and regulations to internalize nature's values; and (iv) shifting underlying societal norms and goals *(established but incomplete)*. Transformative (i.e., system-wide and fundamental) change can be supported by relevant and robust valuation but also local to global institutional change and changes to societal-level norms and goals, to align with global sustainability and justice objectives *(well established)* {2.4.1; 2.4.2; 5.4.2; 5.4.3; 5.3.3} **(Figure SPM.7)**.

Transformative change is more likely to occur when these deep leverage points (i.e., norms and goals) are activated, with the potential to bring change across all spheres in society. Deep leverage points include both the formation and mobilization of sustainability-aligned values (e.g., caring for nature) and shifting societal goals and norms (e.g., shifting the notion of good quality of life linked to material consumption growth, to that derived from sufficiency in contexts of over-consumption) *(well established)* {5.2.2; 5.3.2; 5.3.4}. Governance systems can enable people to form, utilize and maintain sustainability-aligned values that are currently hard to express or act upon, to reduce the dominance of values associated with materialism and individualism, and to balance market and non-market instrumental, relational and intrinsic values *(well established)* {2.4.1.3; 2.5.2; 5.3.2; 5.3.4}. Shifting societal goals towards sustainability and justice would in turn require changing paradigms about how to pursue a meaningful life, moving towards visions of good quality of life and development that are aligned with more respectful relationships among humans and towards nature *(well established)* {5.5}. These

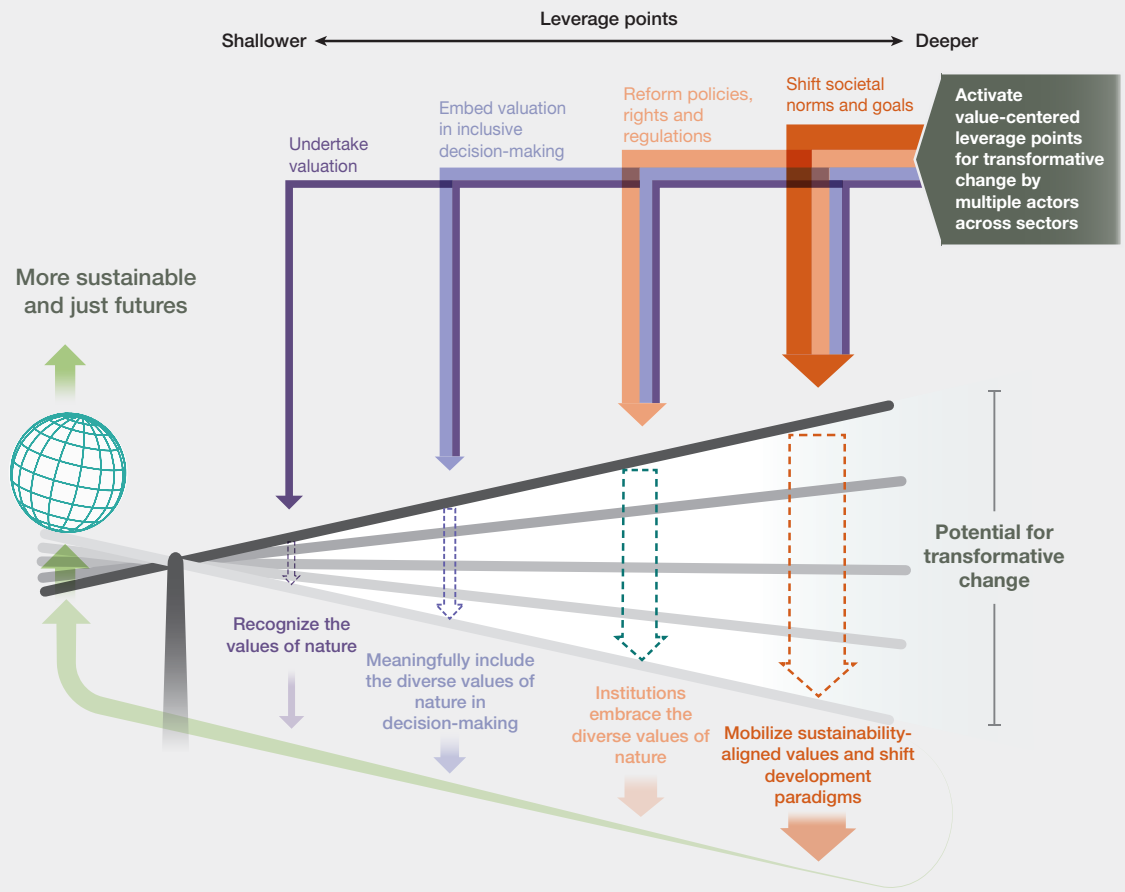


Figure SPM 7 **A set of values-centred leverage points can help create the necessary conditions for activating transformative change towards more sustainable and just futures.**

Leveraging transformative change would be based on the combination of various societal-level actions: (i) recognizing the diversity of nature's values through undertaking relevant and robust valuation; (ii) embedding values in decision-making; (iii) reforming policies and stimulating institutional change; and (iv) shifting societal-level norms and goals to support sustainability-aligned values across sectors. When actions, including policy interventions, focus on activating deeper leverage points (towards the right of the lever), transformative change is more likely to occur {1.3}.

deeper leverage points may only be activated by changing social structures and institutional arrangements *(well established)* {2.4.1; 2.4.2; 2.5.2}. For example, favourable institutional conditions can be promoted that empower civil society to advocate for more sustainable and just future visions, and societal pressure can stimulate institutions to accept those visions (e.g., via public deliberation) *(established but incomplete)* {5.3.3}.

D. Embedding the values of nature for transformative decision-making for sustainability.

D1 Decision-making that fosters sustainability transitions can be advanced by following six interrelated values-centred guidelines: contextualization, design, representation, engagement, legitimization and reflection *(established but incomplete)*.
Six interrelated values-centred guidelines can be followed to embed nature's diverse values in decision-making that promotes sustainability pathways across scales and involve a wide range of social actors **(Box SPM.4)**. These guiding principles apply to all the stages of the policy cycle (from setting agendas to evaluating policies) and can be summarized as follows *(established but incomplete)* {6.5}:

1. *Contextualize* the decision-making process by recognizing the diverse world-views and values of nature that underpin different social-ecological contexts.
2. *Design* decision-making processes considering the conditions and functions of ecosystems and biodiversity, the capacities, knowledge and perspectives of stakeholders through participatory, empowering, deliberative and conflict management approaches.
3. *Represent* meaningfully and respectfully the diverse world-views, broad and specific values held by stakeholders, rights-holders and knowledge-holders involved in decisions about nature.
4. *Engage* interactively with specific actors to promote dialogue, long-term collaboration and co-creation of solutions to conserve and sustainably use nature.
5. *Legitimize* decisions and their impacts by instilling a sense of co-ownership over the valuation process and its results by all actors who take part in nature management.
6. *Reflect* to ensure that decisions impacting nature and its contributions to people are aligned with the values and actions that can foster transformative change towards sustainability.

D2 Environmental policy instruments and policy support tools are more likely to foster transformative change for sustainability and justice when they are aligned with nature's diverse values *(well established)*.
Policy instruments can foster transformative change when: (i) a diversity of specific values (i.e., instrumental, relational and intrinsic values) is considered in their design and implementation; (ii) they address one or more direct or indirect drivers of biodiversity loss; (iii) they mobilize sustainability-aligned values through institutional change; (iv) they promote capacities to embed nature's values into decisions; and (v) they are integrative and adaptive enough to bridge across world-views, values, sectors and scales *(established but incomplete)* {6.2.3; 6.2.4}.

Achieving transformative change is therefore more likely when a broader diversity of nature's values is incorporated into policy instruments and policy support tools (*established but incomplete*) {6.2.3.2}. Using a combination of policy instruments can also lead to a more diverse representation of nature's values and hence increased potential to propel

Box SPM 4 **Operationalizing the six guidelines to embed nature's values into environmental decisions: an example from Canada.**

The Canadian Nuclear Waste Management Organization has addressed the lack of public support for scientifically designed waste disposal options with reduced impacts on society and biodiversity and induced deep transformations in decision-making. Over a 20-year period, the organization has promoted opportunities for collaboration, co-learning, and *reflection* with indigenous knowledge holders. Public consultation processes helped *contextualize* the local knowledge and value systems and weave them with scientific knowledge and technical expertise. Decision-making processes at the disposal sites were then *designed* in an open and transparent way, assessing environmental, social and economic impacts, as well as involving the voluntarily expressed interest of local community members. Stakeholder *engagement* was promoted through an independent advisory body, including indigenous elders and youths from across Canada. In all these steps, different stakeholders' world-views, knowledge and values about nature were voiced and *represented*, leading to improved public support and *legitimacy,* and a lasting impact on institutional structures and the policy process {6.3.1.2}.

system-wide transformations *(well established)* {6.2; 6.3} **(Table SPM.3)**. Whilst economic and legal-regulatory approaches are among the most frequently used environmental policy instruments, only a few of them (e.g., elimination of harmful subsidies, such as tax exemptions to large-scale fisheries) are likely to trigger transformative change **(Table SPM.3)** *(well established)* {6.2}. Sociocultural, customary and rights-based instruments

Table SPM 3 **Potential of environmental policy instruments to support transformative change towards more sustainable and just futures by representing diverse values.**

A selection of environmental policy instruments (37 from the IPBES catalogue and previous assessments) was assessed regarding five key criteria required for transformative governance (columns in the centre). The table shows: (i) the strengths and weaknesses of different policy instruments; (ii) the scales at which they can be implemented; and (iii) the type of stakeholders that are most commonly responsible for their implementation (columns to the right). Larger circles denote that a given instrument can better meet each transformative criterion {6.2}.

	Illustrative policy instruments	POTENTIAL FOR TRANSFORMATIVE CHANGE: Representing diverse values	Addressing direct and indirect drivers	Stimulating institutional change	Enhancing capacities	Being integrative and adaptive	Relevant decision-making scales	Key stakeholders to act
More transformative	Co-management regimes	●	○	○	●	○		Resource users Non-governmental organizations Governments
	Eliminating harmful subsidies	○	●	●	○	○		Governments Intergovernmental organizations
	Payments for ecosystem services	○	●	○	●	○		Governments Non-governmental organizations Business actors
	Other effective area-based conservation measures	●	○	●	○	○		Indigenous peoples and local communities Donors Governments Intergovernmental organizations
	Rights of nature	●	○	●	●	○		Governments
Less transformative	Certification schemes	○	●	○	○	○		Business actors Governments Intergovernmental organizations
	Environmental accounting	○	●	○	○	○		Intergovernmental organizations Governments Business actors
	Legally protected areas	○	○	○	○	○		Governments Intergovernmental organizations Non-governmental organizations
Business as usual	Biodiversity offsets	·	○	·	·	·		Governments Business actors
	Trade bans	·	○	○	·	·		Governments Intergovernmental organizations Business actors

● ○ · More transformative ⟷ Less transformative; International; National; Subnational/Local

(e.g., locally co-managed fisheries) are less common, but have more potential to support systemic transformations *(established but incomplete)* {6.2.2; 6.2.3; 6.3.1}.

Different rights-based approaches have been found to incorporate the diverse values of nature into local and national laws and constitutions (e.g., rights to a healthy environment, rights of nature, rights of Mother Earth, rights of specific entities like rivers, lakes, mountains). These are inspired by indigenous peoples and local communities and can make the case for biodiversity by stimulating institutional change in accordance with national laws and international principles of national sovereignty over natural resources *(well established)* {2.2.3.1; 4.4.3; 6.2.2.2}.

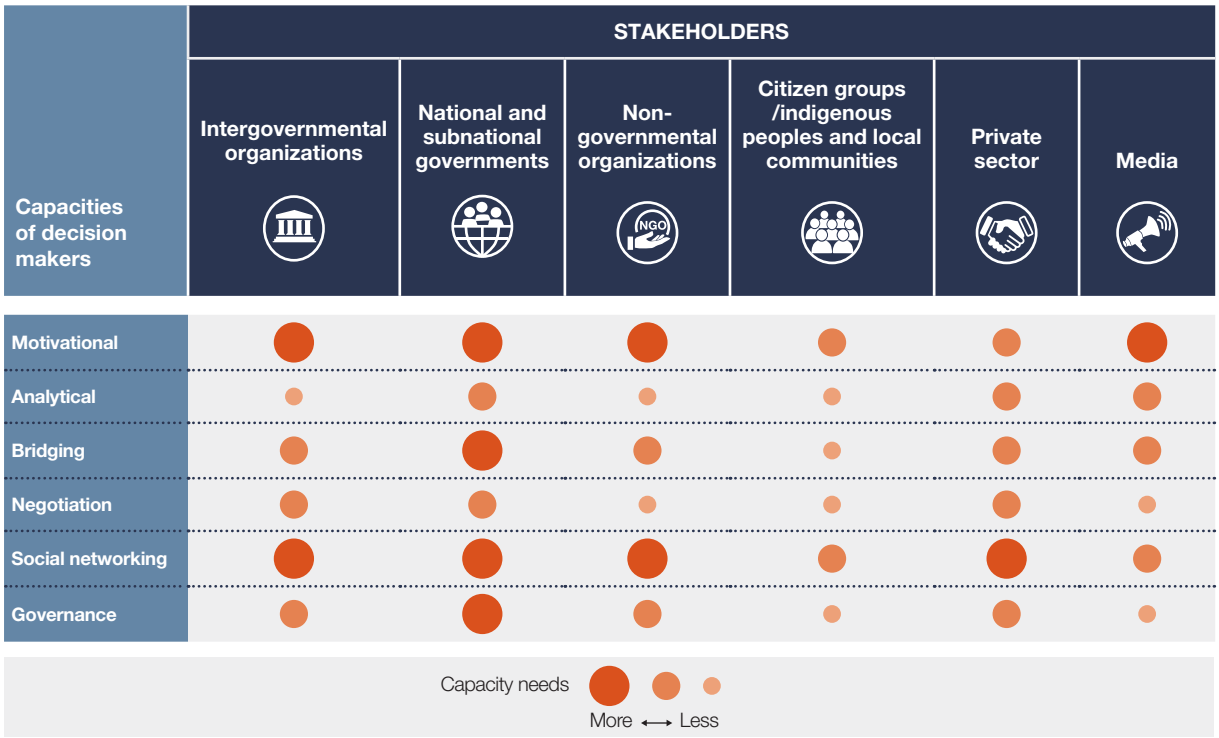
A policy instrument's transformative potential is partly dependent on how it is designed and implemented. For instance, aligning payments for ecosystem service programmes with the values of ecosystem service providers in ways that yield fair distribution of costs and benefits can strengthen sustainability-aligned values *(well established)* {4.3.4; 4.5.3; 5.3.2.3; 5.3.2.4; 6.2.2.1}.

D3 Enhancing the capacities of decision makers to address conflicting or contradictory values can facilitate the consideration of the diverse values of nature in policy decisions *(established but incomplete)*.

Fostering the following capacities of decision makers can help embed the diverse values of nature into decisions **(Table SPM.4)**: (i) *motivational capacities* to raise awareness of, and desire to, consider diverse values in decisions and to mobilize sustainability-aligned values and attitudes towards nature *(established but incomplete)* {6.4}; (ii) *analytical capacities* to enhance the ability of selecting and using suitable tools to gather and synthesize information on nature's values *(well established)* {6.4}; (iii) *bridging capacities* to facilitate learning and reflection across diverse value perspectives *(established but incomplete)* {6.4}; (iv) *negotiation capacities* to represent one's own interests, make compromises, and accept the views of others when managing trade-offs *(established but incomplete)* {6.4}; (v) *social networking* capacities to coordinate across scales and different social groups, managing expectations and risks in an adaptive way *(established but incomplete)* {6.4}; and (vi) *governance capacities* for making accountable, transparent, participatory and law-abiding decisions *(established but incomplete)* {6.4} **(Box SPM.5).**

Table SPM 4 **Capacities of decision makers required to foster the consideration and embedding of the diverse values of nature in policy decisions.**

Different stakeholders require strengthening different capacities. The larger bubbles highlight larger capacity needs. 85 capacity needs grouped into the six categories were identified and ranked through a consultation process involving experts across the chapters of the assessment of the diverse values and valuation of nature. While all stakeholders need capacity development in almost all capacity dimensions, some of them have more resources to act {6.4.4}.



Box SPM 5 Capacity development needs to integrate diverse values in conservation decisions: an example from Japan.

At the Kabukuri Marsh Ramsar Site, located in Northern Honshu in Japan, antagonistic value perspectives of local farmers and conservationists were addressed to allow collaborative management of winter-flooded rice paddies. The Japanese Association for Wild Geese Protection, an organization with strong *bridging capacities*, initiated a social learning process to balance multiple land use objectives that allowed trust-building and increased the *motivational* capacities of farmers and other stakeholders, including non-governmental organizations, local and national government authorities, and researchers. This helped to design activities that were mutually beneficial for the wild geese and local livelihoods. The process was able to mobilize the *analytical capacities* by learning from different knowledge systems. *Negotiation capacities* were enabled to balance local stakeholders' socioeconomic and nature conservation goals. *Social networking capacities* led to connections with other actors in the agricultural value chain (i.e., processors, retailers and consumers) leading to a premium market for sustainably produced rice. Finally, the *governance capacity* of local decision makers led to the designation of the Kabukuri-Marsh as a Ramsar Site, a Wetland of International Importance {6.3.2; 6.5.3}.

D4 Key knowledge and operationalization gaps limit opportunities to effectively embed nature's diverse values in decision-making *(well established)*.

Specific *knowledge gaps* regarding values and valuation limit the quantity and quality of evidence that would be required to foster transformative decision-making **(Table SPM.5)**. Evidence is sparse on: (i) valuation approaches used by indigenous peoples and local communities *(well established)* {2.2; 3.2.4; 6.4.3}; (ii) how inequalities among sociodemographic groups (e.g., different gender groups and generations) affect value expression in decision-making *(well established)* {2.6}; (iii) how and which form of valuation leads to better outcomes for people and for nature (*well established*) {4.5; 4.6; 4.7.1; 6.4.3.5}; and (iv) embedding robust valuation and its uptake in policy *(well established)* {4.6; 6.2; 6.3}. *Operationalization gaps* highlight the obstacles to embedding nature's values in decision-making

Table SPM 5 Categories of knowledge and operationalization gaps that hinder the effective embedding of nature's diverse values in decision-making.

Information on gaps was collected and synthesized across all the chapters of the assessment of the diverse values and valuation of nature. For each gap category (left column) the most pressing issues (right column) are highlighted {6.4.2; 6.4.3}.

Most pressing issues	Potential solutions
Conceptualization of nature's diverse values	Document the diverse values of nature for different sociodemographic groups, social-ecological contexts, spatial and temporal scales, and knowledge systems
Choice of valuation methods to support decision-making	Design valuation processes to fit decisions that lead to specific outcomes
Understanding notions of "value" and "valuation" for indigenous peoples and local communities	Make visible the values of indigenous peoples and local communities on their own terms
Ensuring the uptake of valuation results in decision-making	Document the uptake of valuation into decisions, the barriers and enablers of uptake, and the outcomes derived from uptake
Designing and operationalizing policy tools that consider nature's diverse values.	Document best-practice policy tools and their transformative change potential
Considering values and valuation as leverage points for transformative change	Assess how institutions can better embrace nature's diverse values and how sustainability-aligned values can be further mobilized
Understanding the role of values in future scenario planning and development	Document how nature's values play a role in future scenarios, and the role of sustainability-aligned values in shaping sustainability pathways
Considering justice perspectives in valuation	Analyse the role of power in value expression and how justice dimensions are influenced by valuation

in support of transformative change. Both knowledge and operationalization gaps have hindered the uptake of valuation into decisions (*established but incomplete*) {4.2.4; 4.3.1; 4.3.2; 4.6.2; 6.4.2;}.

Knowledge and operationalization gaps arise fundamentally from a lack of *context-specific knowledge* (e.g., limits to assessing trade-offs among values), *resources* (e.g., financial and technical deficits to undertake valuation) or *capacities* (e.g., lack of ability to implement context-specific valuation) across different actors involved in the policy cycle *(well established)* {2.3.1; 4.4; 4.6; 6.4; 3.4.4; 6.4}.

Knowledge and operationalization gaps are widespread but more prevalent in developing countries *(established but incomplete)* {3.3.3; 4.6.4; 5.2.1}. Comprehensive overviews of valuation requirements (e.g., capacities, data, resources, technologies), and how these vary across decision-making contexts are scarce *(well established)* (3.3.3). To overcome these gaps, policymakers may consider them and support the development of specific capacities of key stakeholders, drawing on available context-specific expertise (e.g., understanding of the different world-views of local stakeholders).

D5 The values held and expressed by indigenous peoples and local communities can inspire environmental governance models in different social-ecological contexts *(established but incomplete)*.

Sustainability-aligned values held and expressed by many indigenous peoples and local communities have inspired other societies around the world, and the incorporation of these values into laws and regulations **(Box SPM.6)**. These values can be adopted at different scales and administrative levels, including, for instance, large-scale territorial governance. Collaborative governance and co-design of management plans and policies offer opportunities to make use of indigenous and local knowledge in the design and implementation of sustainable alternatives. For example, indigenous peoples have co-designed community-based sustainable use and conservation areas, and also taken part in the governance of protected areas *(established but incomplete)* {4.4.2; 4.4.2.2; 4.4.3.2; 4.5; 5.3.4.2}. Values held by a wide range of communities and organized civil society groups, such as youth social movements, have also been incorporated in development agendas and policies across scales *(established but incomplete)* {2.2.1; 2.2.3}. Developing 'bridging' and 'governance' capacities can aid the translation of indigenous and local values into laws and regulations that could mobilize society's sustainability-aligned values (*established but incomplete*) {4.4.3.2; 6.3.1}.

Addressing the loss of indigenous peoples' and local communities' languages, knowledge and values can be aided by establishing alliances with economic, social and political actors, to help reduce vulnerabilities posed by the loss of biocultural diversity *(established but incomplete)* {2.2.2; 2.3.2; 2.2.4; 4.4.4; 6.3.1; 6.3.2; 6.4.2.2.3}. Alliances between civil society organizations and networks of indigenous peoples and local communities have promoted the recognition and incorporation of values and knowledge associated with local food systems and agrobiodiversity by national institutions, to address food security problems *(established but incomplete)* {4.4.4}.

D6 Balancing perspectives on nature's values across sectoral policies can enhance coherence among policy instruments needed for sustainability *(well established)*.

Sectoral policies often lack coherence among them and rarely consider the full suite of nature's values in their respective implementation plans and development narratives. This is in part due to the failure to fully recognize social-ecological interactions in different contexts, thus hindering the achievement of the Sustainable Development Goals *(established but incomplete)* {4.3; 6.3; 6.5}. For

Box SPM 6 Opportunities and challenges for integrating indigenous and local values in policy contexts: an example from the South American Andes.

Philosophies of good living are associated with ideas of collective good quality of life among people and nature, and are closely associated with the world-views, languages and knowledge systems of many indigenous (and non-indigenous) communities {1.5.2; 2.2.1; 2.2.2; 2.2.3.1; 2.2.4.1}. For example, the notion of *vivir bien* or *buen vivir* (good living) is rooted in indigenous Andean world-views and languages (*sumak kawsay* in Kichwa, and *suma qamaña* in Aymara), and illustrates pathways for linking collective good quality of life and nature's values with policy decisions {1.5.2; 2.2.3}. In some Andean communities, values embedded in *buen vivir* philosophies have historically been part of territorial management plans. Those values have been institutionalized in the constitutions of Ecuador and the Plurinational State of Bolivia and other national policies. They have also been expressed in intercultural educational policies and have inspired global rights-of-nature policies protecting rivers, ecosystems and species {2.2.4.1; 5.5.4}. Yet, embedding such values in policymaking across scales also entails challenges. For example, these values and principles may be used as propaganda rather than genuinely fostering transformative change. Even if *vivir bien* or *buen vivir bien* is a constitutional principle, it can be used to legitimize status-quo governmental development agendas {4.4.3}. Ethical and transparent involvement of indigenous peoples and local communities can guide transformative policies {4.4.3; 6.4}.

instance, food security policies often overlook issues of cultural identities linked to food, dietary diversity and relationships to environmental health. Consequently, these policies may promote agricultural practices that run counter to intrinsic values connected to biodiversity conservation and other relational and instrumental values associated with human health and cultural identity *(well established)* {4.4.4; 6.3.1; 6.3.2}. Similar conflicting outcomes can also be seen in the implementation of policies between different subsectors, such as addressing biodiversity and climate goals, indicating the need for more horizontal or intrasectoral alignment of values. Balancing such divergent perspectives across sectors on the values of nature and its contributions helps ensure coherence among policy goals *(well established)* {6.3}. For example, opportunities for sustainability transitions in urban settings can address a range of problems, including pollution, unequal access to green spaces, and the livelihoods of marginalized communities *(well established)* {6.3}.

These issues are increasingly being tackled by policies aiming at enhancing social-ecological resilience based on nature's values, such as policies linked to urban planning (e.g., blue and green infrastructure planning that capture instrumental and relational values), natural disaster risk reduction practices (e.g., eco-disaster risk reduction approaches that capture intrinsic and instrumental values), or addressing climate change mitigation and adaptation and biodiversity loss (e.g., nature-based solutions[12, 13] and ecosystem-based approaches, among other relevant approaches capturing instrumental and intrinsic values) (*well established*) {6.3.1}.

D7 Value trade-offs across scales can be addressed by institutions that permeate across administrative boundaries *(established but incomplete)*.

A key challenge for environmental governance is that different stakeholders act upon different values across spatial, temporal and organizational scales *(well established)* {5.3}. For example, Governments may promote relational values associated with place-based identity at the local level, intrinsic values associated with biodiversity conservation by establishing natural protected areas at the regional level, and non-market instrumental values associated with climate change mitigation through international agreements (e.g., the instrumental value of storm buffering by coastal ecosystems). Such cross-scale value interactions are, in turn, influenced by power relations among the different actors that operate across these scales (*well established)* {1.2.3; 2.4.2; 4.2; 4.3}.

Governments can support and enable flexible and adaptive institutional designs that permeate across administrative boundaries to connect national and subnational scales and address value trade-offs *(established but incomplete)* {5.4}. Other actors, such as international civil society organizations and multilateral agencies, can bridge values across scales in managing transboundary environmental and development issues (e.g., the intergovernmental bodies providing science-based policy options at multiple scales for assisting policymaking for climate change) (*established but incomplete)* {5.4.2}. Such actors can help communicate evidence-based knowledge to foster collaboration around shared values of nature and embed diverse understandings about human-nature relationships into decisions (*established but incomplete)* {5.4}.

D8 Social learning facilitates embedding the values of nature in decision-making *(established but incomplete)*.

Social learning creates opportunities for mutual understanding of nature's values in participatory and deliberative decision-making processes; this requires collective learning, action and reflection between individuals and groups regarding interactions with nature, and openness and transparency *(well established)* {5.3.5.4; 5.3.5.2; 5.4.4; 6.3.2.2}. Social learning can also be built into valuation processes to improve their relevance and robustness *(established but incomplete)* {4.3; 4.5; 5.4.4}. Some policy instruments, such as participatory land and ocean use planning, are built on social learning processes and contribute to the recognition, mobilization, incorporation and co-creation of diverse values of nature (*well established*) {5.4.4; 6.3.2}.

Social learning processes, such as awareness-raising campaigns, targeted at specific life stages, genders, and sociocultural groups, can further mobilize sustainability-aligned values (*established but incomplete*) {2.5.1; 2.5.2; 5.3.2}. In particular, environmental education programmes are especially relevant in early life stages *(well established)* {2.5.1; 5.3.2}. Social learning in corporate contexts can be targeted at increasing connectedness with nature *(established but incomplete)* {2.2.1}. Intercultural and multilingual education can also be fostered to mobilize sustainability-aligned values (*well established)* {2.2.2}.

D9 Scientists, policymakers, indigenous peoples and local communities and other societal actors can collaborate in achieving the 2030 Agenda for Sustainable Development and implementing the future post-2020 global biodiversity framework by ensuring due consideration of the diverse values of nature *(established but incomplete)*.

12. The present assessment uses the term "nature-based solutions" as defined by resolution 5/5 of the United Nations Environment Assembly of the United Nations Environment Programme: "actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits".

13. With regards to including diverse values, at one point in the assessment, the catch-all nature of the nature-based solutions concept raises a question mark, since nature-based solutions can vary considerably regarding how much they support biodiversity {6.3.1.1}.

Achieving shared visions, such as those globally agreed under the Convention on Biological Diversity, relies on providing strategic policy guidance for national, subnational and local implementation as well as developing capacities to bridge across the different values of nature through fair and equitable participation of different actors, including indigenous peoples and local communities **(Table SPM.6)**. Values-centred transformative change can be propelled by strengthening collaborations across diverse societal actors to revert the biodiversity crisis and navigate pathways to more sustainable and just futures {*established but incomplete*} {1.5.3; 1.5.4; 3.1; 3.5; 4.6; 4.7; 5.4; 6.3; 6.4.2}. The One Health approach illustrates how different actors can collaborate by being mindful of nature's diverse

Table SPM 6 **Transformative change can be propelled by synergistic actions by different actors to advance the consideration of the diverse values of nature in decision-making.**

Values-centred concerted actions by social actors are needed to achieve shared visions to revert the biodiversity crisis and navigate towards more sustainable and just futures. Examples of these actions are provided in the table.

Values-centered action points	STAKEHOLDERS						
	Intergovern-mental organizations	National and subnational governments	Non-govern-mental organiza-tions	Academia	Citizen groups / indigenous peoples and local communities	Private sector	Media
Embed diverse values into decisions	Promote the incorporation of diverse values into national biodiversity strategies	Implement policies that articulate diverse values	Develop values-centred safeguards	Address knowledge gaps	Mobilize sustainability-aligned values	Implement standards for values-based corporate responsibility	Communicate on the diversity of values of nature
Foster policy coherence across sectors based on sustainability-aligned values	Align policy with value diversity	Establish coordination mechanisms among sectors around shared values	Foster initiatives to make visible diverse values	Advance inter and trans-disciplinary research on values	Advocate for recognition and respect for diverse values	Engage in cross-sectoral dialogue to build shared values	Highlight stories of successful values alignment
Ensure representation of stakeholders' values	Develop standards for inclusive participation in decisions	Encourage participatory policy design	Support valuation uptake in policy decisions	Assess representation in valuation and outcomes	Promote respect for marginalized world-views and values	Adopt practices of inclusive participation	Promote public debates on the diverse values of nature
Enable capacities to embed diverse values into decisions	Address barriers (e.g. understanding of trade-offs) to develop capacities of stakeholders	Enable mechanisms for policy uptake of plural valuation	Support capacity development activities based on nature's values	Build research programmes to strengthen the transformative potential of values-centred leverage points	Network to foster peer-to-peer learning	Support capacity development on values-based corporate sustainability standards	Train communication experts (including local communicators) on the role of nature's values
Strengthen co-learning among stakeholders to develop shared values	Promote projects that entail cross-sectoral planning by highlighting best practices	Encourage collaborative learning across scales and sectors	Document good co-learning practices across actor groups	Promote research on values incorporating different knowledge systems	Support awareness-raising among peers	Promote co-learning with affected stakeholders	Communicate on how shared values are built
Enhance resource mobilisation for plural valuation and policy uptake	Foster international commitments to undertake plural valuation and uptake	Allocate resources for capacity-building to support uptake of valuation	Ensure project funding is targeted to addressing key gaps	Channel resources for plural valuation research	Support crowdfunding to enable wider participation in decision-making	Allow for plural valuation and its uptake	Highlight gaps in resource availability

values **(Box SPM.7)**. The recognition and consideration of the diverse values of nature that stem from different knowledge systems, including non-anthropocentric approaches, can support the achievement of the 2030 Agenda for Sustainable Development, the future post 2020 global biodiversity framework and other relevant multilateral environmental agreements *(well established)* {2.1.2, 2.2.3.1, 2.3.2, 2.4.2, 5.2, 6.5}.

Box SPM 7 The One Health approach as an example of collaborative action on nature's diverse values.

The "One Health" approach[14] has been initiated and is under further development by several international bodies (e.g., Convention on Biological Diversity, Food and Agriculture Organization of the United Nations, World Health Organization, World Organisation for Animal Health, United Nations Environment Programme) and aims to jointly achieve human, domestic and wild animal and environmental health across multiple levels of society towards achieving sustainable development {6.3.2.1}. It considers diverse values associated with various sectoral interests related to food and water (e.g., food security, culture), health (e.g., prevention and control of zoonoses), climate (e.g., adaptation to extreme climatic hazard), and biodiversity conservation (e.g., wildlife trade regulation) {6.3.2.1}.

National Governments and regional bodies are voluntarily setting up their own One Health strategies. For instance, Singapore, through its *city in nature concept,* is promoting more biodiverse urban areas connected to national parks, emphasizing biodiversity conservation (intrinsic values) and enhancing disease regulation (instrumental values) and mental health (relational values). International civil society organizations and donor agencies are promoting the implementation of One Health with further potential for influencing national and subnational policies through training and advocacy efforts, which help make visible the diversity of values of nature {6.3.2.1}. Context-specific and different social and economic conditions are relevant for implementing actions related to the One Health approach {6.3.2.1}.

Collaborations between researchers, practitioners and indigenous peoples and local communities seek to integrate and share databases (e.g., on animal and human diseases) and context-based understandings (e.g., local knowledge on medicinal plants to minimize antibiotic use) to co-develop (and co-learn from) good practices (e.g., management of the human-livestock-environment nexus) {6.3.2}. Civil society organizations are taking into account the values of nature and its contributions to health and are identifying preventive and therapeutic interventions to support livestock health, reduce disease transmission to people and enhance food safety {6.3.2}.

14. See www.fao.org/3/cb7869en/cb7869en.pdf.

APPENDIX

APPENDIX
Communication of the degree of confidence.

Figure SPM A 1 **The four-box model for the qualitative communication of confidence.**

Confidence increases towards the top-right corner, as suggested by the increasing strength of shading. Source: IPBES (2016).[15] Further details of the approach are documented in the *IPBES Guide on the Production of Assessments*.[16]

In the methodological assessment regarding the diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services, the degree of confidence in each main finding is based on the quantity and quality of evidence and the level of agreement regarding that evidence **(Figure SPM.A1)**.

The evidence includes data, theory, models and expert judgement.

- **Well established:** there is a comprehensive meta-analysis or other synthesis or multiple independent studies that agree.
- **Established but incomplete:** there is general agreement, although only a limited number of studies exist; there is no comprehensive synthesis, and/or the studies that exist address the question imprecisely.
- **Unresolved:** multiple independent studies exist but their conclusions do not agree.
- **Inconclusive:** there is limited evidence and a recognition of major knowledge gaps.

15. IPBES (2016): Summary for Policymakers of the Assessment Report on Pollinators, Pollination and Food Production of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Potts, S.G., Imperatriz-Fonseca, V. L., Ngo, H. T., Biesmeijer, J. C., Breeze, T. D., Dicks, L. V., Garibaldi, L. A., Hill, R., Settele, J., Vanbergen, A. J., Aizen, M. A., Cunningham, S. A., Eardley, C., Freitas, B. M., Gallai, N., Kevan, P. G., Kovács-Hostyánszki, A., Kwapong, P. K., Li, J., Li, X., Martins, D.J., Nates-Parra, G., Pettis, J.S., Rader, R. and Viana, B.F. (eds.). IPBES secretariat, Bonn, Germany. http://doi.org/10.5281/zenodo.2616458.

16. IPBES (2018): IPBES Guide on the Production of Assessments. Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. Available at https://ipbes.net/guide-production-assessments.

Chapter 1

Chapter **1**

THE ROLE OF THE VALUES OF NATURE AND VALUATION FOR ADDRESSING THE BIODIVERSITY CRISIS AND NAVIGATING TOWARDS MORE JUST AND SUSTAINABLE FUTURES[1,2]

COORDINATING LEAD AUTHORS:
Patricia Balvanera (Mexico), Unai Pascual (Spain/Switzerland), Michael Christie (United Kingdom of Great Britain and Northern Ireland), Brigitte Baptiste (Colombia)

LEAD AUTHORS:
Christopher B. Anderson (Argentina, United States of America/Argentina), Simone Athayde (Brazil/United States of America), David N. Barton (Norway, United Kingdom of Great Britain and Northern Ireland/Norway), Rebecca Chaplin-Kramer (United States of America), Sander Jacobs (Belgium), Eszter Kelemen (Hungary), Ritesh Kumar (India/Wetlands International), Elena Lazos (Mexico), Adrian Martin (United Kingdom of Great Britain and Northern Ireland), Tuyeni H. Mwampamba (United Republic of Tanzania/Mexico), Barbara Nakangu (Uganda/World Wildlife Fund), Patrick O'Farrell (South Africa), Christopher Raymond (Australia, Netherlands/Sweden, Finland), Suneetha M Subramanian (India/United Nations University Institute for the Advanced Study of Sustainability), Mette Termansen (Denmark), Meine van Noordwijk (Netherlands/Indonesia), Arild Vatn (Norway)

FELLOWS:
Bosco Lliso (Spain), Ana Sofia Monroy-Sais (Mexico)

CONTRIBUTING AUTHORS:
SoEun Ahn (Republic of Korea), Sacha Amaruzaman (Indonesia), Ariane Amin (Ivory Coast), Paola Arias-Arevalo (Colombia), Cem İskender Aydın (Türkiye), Antonio J. Castro Martinez (Spain), Alta de Vos (South Africa), Nicolas Dendoncker (Belgium), Stefanie Engel (Germany), Uta Eser (Germany), Daniel Faith (Australia), Anna Filyushkina (Russian Federation), Daniela Flores Mendez (Mexico), Houda Ghazi (Morocco), Alexander Girvan (Jamaica), Erik Gomez-Baggethun (Norway), Rachelle K. Gould (United States of America), Haripriya Gundimeda (India), Thomas Hahn (Sweden), Zuzana V. Harmáčková (Czech Republic), Marcello Hernandez-Blanco (Costa Rica), Andra-Ioana Horcea-Milcu (Romania), Mariaelena Huambachano (Peru, New Zealand/United States of America), Pricila Iranah (Mauritius/United States of America), Mine Islar (Türkiye / Sweden), Jasper Kenter (Netherlands/United Kingdom of Great Britain and Northern Ireland), Ann-Kathrin Koessler (Germany), Marina Kosmus (Argentina/Germany), Heera Lee (Republic of Korea/Germany), Beria Leimona (Indonesia), Sharachchandra Lele (India), Dominic Lenzi (Australia, Italy/Netherlands), Natalia Lutti Hummel (Brazil), Lelani Mannetti (Namibia/United States of America), Juliana Merçon (Brazil), Nibedita Mukherjee (India/United Kingdom of Great Britain and Northern Ireland), Barbara Muraca (Italy/United States of America), Roldan Muradian (Netherlands/Brazil), Ranjini Murali (India), Sara Nelson (United States of America/Canada), Gabriel Ricardo Nemoga (Colombia/Canada), Emmanuel Nuesiri (Cameroon/Nigeria), Jonas Ngouhouo Poufoun (Cameroon/France), Aidin Niamir (Islamic Republic of Iran/Germany), Arlen Valeria Ocampo Castrejon (Mexico), Tobias Nyumba Ochieng (Kenya), Begüm Özkaynak (Türkiye), Ignacio Palomo (Spain), Ram Pandit (Nepal/Australia), Agnieszka Pawlowska-Mainville (Canada, Poland/Canada), Luciana Porter-Bolland (Mexico), Martin Quaas (Germany), Julian Rode (Germany), Ricardo Rozzi (Chile/United States of America), Sonya Sachdeva (United States of America), Aibek Samakov (Kyrgyzstan), Marije Schaafsma (Netherlands/United Kingdom of Great Britain and Northern Ireland), Nadia Sitas (South Africa), Paula Ungar (Colombia), Evonne Yiu (Singapore), Yuki Yoshida (Japan), Eglee Zent (Bolivarian Republic of Venezuela), Andy Choi (Republic of Korea)

1. This is the final text version of Chapter 1.
2. Authors are listed with, in parentheses, their country or countries of citizenship, separated by a comma when they have more than one; and, following a slash, their country of affiliation, if different from that or those of their citizenship, or their organization if they belong to an international organization. The countries and organizations having nominated the experts are listed on the IPBES website (except for contributing authors who were not nominated).

REVIEW EDITORS:
Hebe Vessuri (Bolivarian Republic of Venezuela), Robert T. Watson (United Kingdom of Great Britain and Northern Ireland)

TECHNICAL SUPPORT UNIT:
Louise Guibrunet, Victoria Contreras

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Chapter **1**

THE ROLE OF THE VALUES OF NATURE AND VALUATION FOR ADDRESSING THE BIODIVERSITY CRISIS AND NAVIGATING TOWARDS MORE JUST AND SUSTAINABLE FUTURES

1.1 WHY IS AN ASSESSMENT ON VALUES AND VALUATION NEEDED?

1.1.1 Why conducting an IPBES methodological assessment on values and valuation?

Despite humanity's reliance on nature, rapid and devastating loss of biodiversity is pervasive across our planet. The fabric of life is weakening and humanity is failing in its responsibility to live in balance with nature, preventing the flourishing of humans and of the other species with which we share the living world. Furthermore, the burdens of biodiversity loss, ecosystem degradation and climate change are felt unequally across societies and social groups (FAO, 2020; IPBES, 2019; UNEP, 2021).

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was created to assess existing knowledge and inform governments about the magnitude, dimensions, consequences and options for action related to the biodiversity crisis. IPBES aims "to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development" (IPBES, 2012). IPBES focuses on the interlinkages between people and nature and aims to address the causes of biodiversity loss and ecosystem degradation, as well as the subsequent loss of their contributions to present and future generations, while identifying ways to shift these trends towards more sustainable pathways.

The understanding of the *values of nature* is a fundamental step to better comprehend and manage the interlinkages between people and other-than-human nature, including the ways in which people *conceive and value nature*, and how these values *play out in decisions* towards achieving *a good quality of life* (Díaz *et al.*, 2015a). Nature is understood by IPBES and by the values assessment in an inclusive way, encompassing multiple perspectives and understandings of the natural world, such as biodiversity and those perspectives of indigenous peoples and local communities who use and embody concepts like Mother Earth (Díaz *et al.*, 2015a). Further, the way nature contributes to quality of life can be interpreted differently across societies and cultures (see Annex 1.1). The values people hold for nature reflect the goals, beliefs, and importance that people assign to nature's different facets and components (Pascual *et al.*, 2017).

Values of nature vary greatly across knowledge systems, languages, cultural traditions and environmental contexts (Harmon, 2002; Koltko-Rivera, 2004; Nemogá, 2019). The way people value nature is influenced by how they interpret their relationship with nature (see 2.2.1 and 2.2.2), people and nature can be seen as part of holistic and interdependent systems of life, or considered separate from nature. Diverse understandings of nature are expressed in different ways (e.g., via symbols, rituals, languages and data and models). Nature's values also partially shape the behaviour of individuals, societies, and organizations, as well as their attitudes towards nature. Yet, understanding the role of values of nature in decisions that can impact on nature is not an easy task. People perceive, interpret, judge, and relate to nature in very different, and sometimes, incompatible ways. Also, some actors' values can dominate decisions while those of other actors may be marginalised, often leading to inequitable outcomes or conflicts (Díaz *et al.*, 2015a; PBES, 2016b, 2019; Pascual *et al.*, 2017).

Global and national initiatives have recognised the importance of living in harmony with nature and of achieving more equitable access to the benefits from biodiversity (e.g.,

CBD, 2020). The targets of the post-2020 global biodiversity framework being prepared under the Convention on Biological Diversity (CBD) are expected to provide globally shared objectives relating to biodiversity conservation, while the United Nations Sustainable Development Goals (SDGs) express a common vision for maintaining the strong interlinkages between people and nature. These and other multilateral environmental agreements represent global aspirations that articulate shared values of nature.

1.1.2 The values assessment builds on previous initiatives

The importance and diversity of the values of nature were officially recognised internationally in the CBD, which was adopted at the United Nations Conference on Environment and Development (i.e., the Rio "Earth Summit") in 1992 (United Nations, 1992). In its preamble, the Convention outlines the many ways in which the diverse values of nature have been deemed important: '*Conscious of the intrinsic value of biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components* [...]' (United Nations, 1992, p. 1). Since then, some international assessments and frameworks, including IPBES assessments, have aimed to better understand the various ways people value nature, the methods used to capture nature's values, and approaches used to feed these values into development frameworks and policy decisions **(Figures 1.1** and **1.2)** (Annex 1.2).

The values assessment builds on decades of academic and management work concerning values and valuation of nature, including the IPBES conceptual framework (Díaz *et al.*, 2015a; IPBES-2/4) and the *Preliminary guide on values and valuation* (IPBES, 2016a), which are this assessment's foundations. It draws on insights from previous IPBES

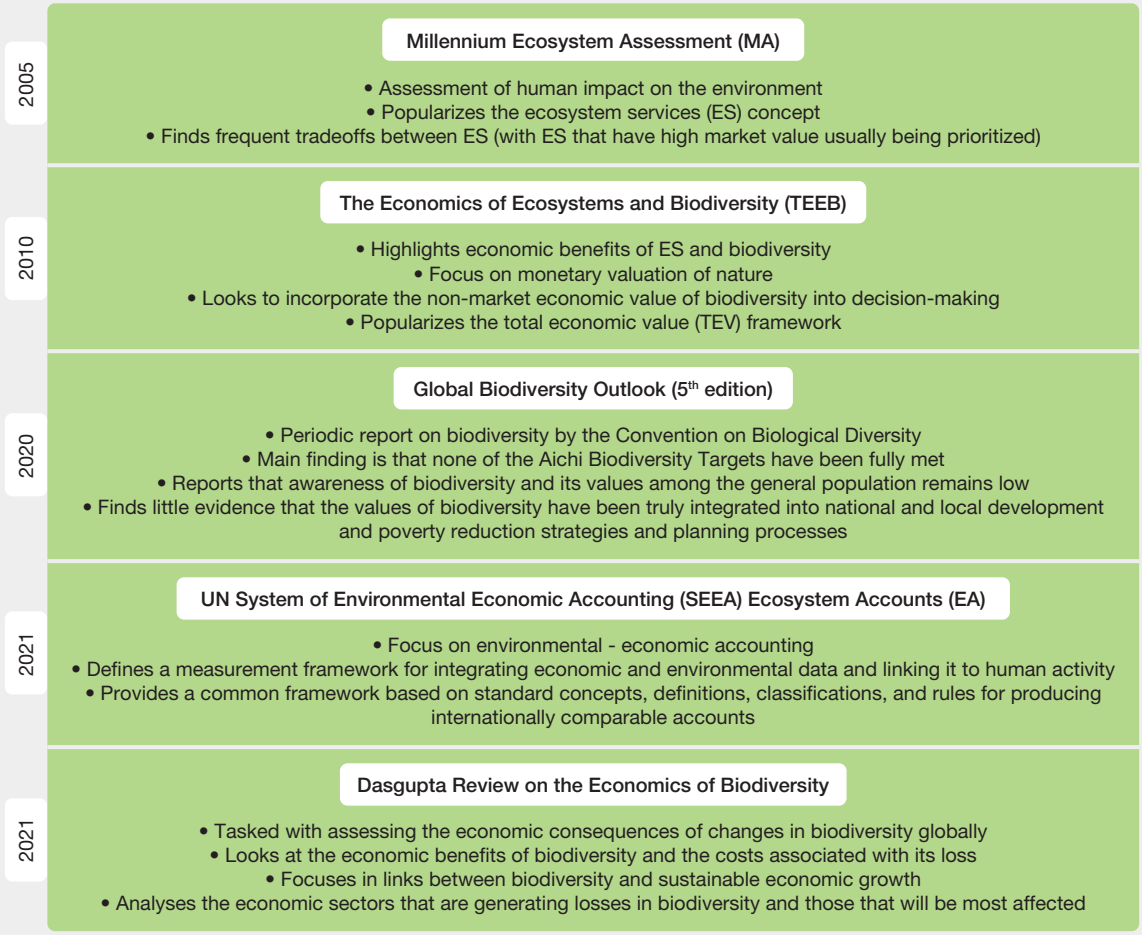


Figure 1 1 **Timeline and focus of influential international, non-IPBES assessments and policy documents dealing with the values of nature.**

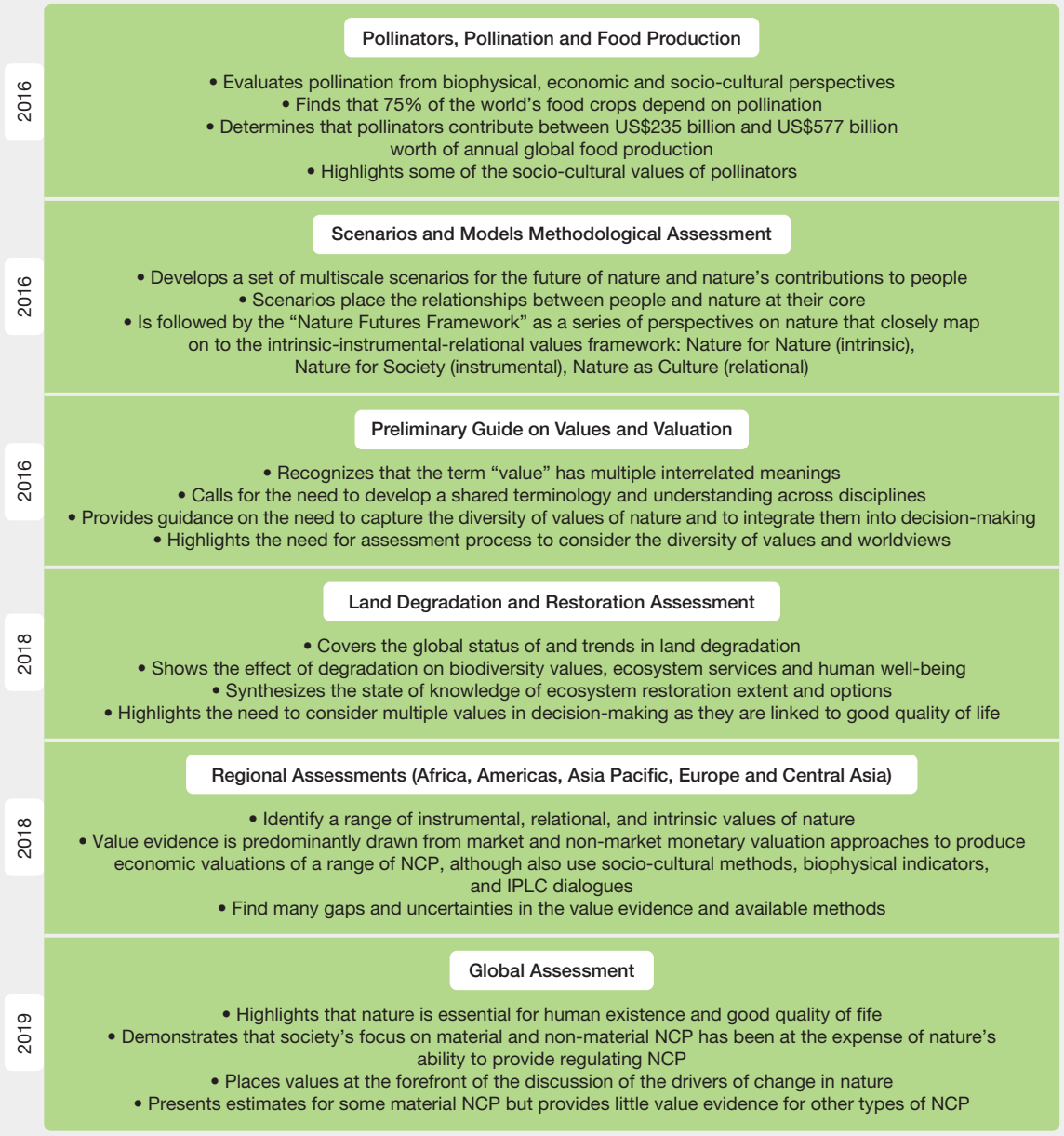


Figure 1 2 **Timeline and focus of completed IPBES initiatives that emphasise the values of nature.**

thematic, regional, and global assessments. It complements other important science-policy efforts that have called for making the values of nature explicit in decision-making, including the 'The Economics of Ecosystems and Biodiversity' report (TEEB, 2010) and the more recent Dasgupta Review (Dasgupta, 2021) **(Figure 1.2)**. This assessment enhances and expands these efforts, in order to emphasise a greater plurality of values of nature, taking into consideration various perspectives, knowledge systems, and disciplinary traditions.

1.1.3 The IPBES values assessment as a methodological assessment on values and valuation

As with all IPBES assessments, the *values assessment* is tasked with reviewing, synthesising, analysing, and judging the policy relevance of the state of knowledge, as well as identifying knowledge gaps. This knowledge is collected from the peer-reviewed academic literature, publicly

available policy and management documents (academically known as 'grey' literature), and other important sources such as indigenous and local knowledge (ILK) (see 1.4). As such, the assessment does not generate new data, but instead provides a state-of-the-art synthesis of knowledge meant to inform decision-making and policy options for a diverse range of stakeholders.

The *values assessment* is a *'methodological assessment regarding the diverse conceptualisations of the multiple values of nature and its benefits, including biodiversity and ecosystem services'* (IPBES/6/INF/9). Consequently, it applies the IPBES approach to assess multiple sources and traditions of knowledge regarding the diverse values of nature, including the strengths and weaknesses associated with existing valuation methods and approaches. The assessment provides conceptual and practical tools to aid policymakers in the recognition and accounting of nature's values in different decision-making contexts. The values assessment provides guidelines, criteria, tools, and a road map to navigate the ways in which values play out in civil society and public sector decisions today, as well as the role values and valuation can have in achieving more sustainable pathways. The assessment, therefore, explores to what extent, and in which ways, the diverse values of nature have been, and can better be, incorporated into decision-making. It also sheds light on the implications of including or excluding different types of values from public policy decision-making processes, and how this may affect transitions to more just and sustainable futures. It should be noted that the assessment does not provide quantifications (e.g., in monetary or other indicators) of the diverse values of nature across the globe (these are presented in previous IPBES thematic, regional, and global assessments), since the emphasis here is on methodologies.

The specific objectives of the *values assessment*, addressed across its six chapters, are to:

- Assess the diverse conceptualisations of the values of nature and of nature's contributions to people across different knowledge systems and socio-economic, ecological and cultural contexts (see Chapter 2);
- Assess the range of valuation approaches and methodologies that exist to make visible and capture the values of nature and nature's contributions to people into decisions, and provide insights on how valuation can be made more relevant, robust and resource efficient (see Chapter 3);
- Assess the extent to which values of nature are expressed or excluded in institutional and governance systems and which factors affect such expression, as well as assess the outcomes of recognising the diversity of values of nature on both people and nature in a range of decision-making contexts (see Chapter 4);
- Assess which combinations of values of nature are associated with future scenarios and pathways to sustainability, and how more diverse values can be mobilised to leverage system-wide transformation towards more just and sustainable futures (see Chapter 5); and
- Assess the opportunities and challenges for the operationalisation of values and valuation as leverage points, as well as identify the key capacity-building needs across relevant stakeholders and sectors to address current knowledge and operationalisation gaps relative to values and valuation and offer principles to guide this process (see Chapter 6).

1.1.4 The audience of the values assessment

The values assessment is targeted towards a wide range of stakeholders in the public and private sectors and civil society. The assessment's findings are relevant to governments (across administrative scales), multilateral organizations, the private sector (including small to large corporations), donors (e.g., aid providers), civil society organizations (CSOs), indigenous peoples and local communities (IPLCs), resource managers and users, academia, and media outlets (see 6.1.2.2 for more information on the different types of stakeholders).

The values assessment is intended to inform policies (from local to global) and is expected to be particularly relevant for example during the operationalisation of the post-2020 global biodiversity framework being prepared under the CBD, which is expected to be adopted in 2022. It can also contribute to the operationalisation of the 2030 Agenda for Sustainable Development with a values-centered perspective. The assessment also provides tools and insights that can contribute towards other international initiatives, global biodiversity related policies, public sector natural capital accounting initiatives, biodiversity related policy instruments at local, regional, and national scales, international environmental non-governmental organizations, global research initiatives, and databases to monitor the interdependencies between people and nature.

1.2 WHY DO THE VALUES OF NATURE MATTER?

1.2.1 Values of nature

What are the *"values of nature"*?

The word "value" means different things. It can reflect life goals, beliefs and general guiding principles. It can also reflect the opinions or judgements of the importance of specific things in particular situations and contexts. Moreover, the ways in which "values" are conceptualized and linked to specific decisions and actions varies greatly across academic disciplines, as informed by different worldviews (Bigger & Robertson, 2017; Daily *et al.*, 2000; Fish & McKelvey, 2021; O'Neill *et al.*, 2008; Smith, 2016). For example, the idea of "value" can refer to a principle, the notion of worth, or an indicator, such as price, as explored for the particular case of the value of nature (IPBES, 2016a; Pascual *et al.*, 2017). Therefore, it is important to note that the word "value" means different things, depending on the context. Consequently, it is challenging to identify a general definition of what the "value(s) of, about or for nature" mean, in a way that it makes sense and is agreeable across all knowledge systems, academic traditions, and lay people's understandings (see 2.1.1, 2.2.3).

In this assessment, *the values of nature* are representations of what people and society care about and what they consider important in relation to nature. While there are nuanced conceptual and linguistic differences among the expressions "values of nature", "values about nature", "values pertaining to nature" and "nature's values", this assessment generally uses them interchangeably, unless the aim is to convey a specific meaning or apply the term in a particular context. Further, when referring to the values of nature, values can refer to nature itself, to how nature contributes to people's quality of life, and also to the way people conceive of and relate to nature (Díaz *et al.*, 2015a; 2015b). The values of nature, therefore, not only refer to the way people express the value of life-supporting processes, functions and systems, but also to the interrelated biophysical, spiritual and symbolic aspects of nature, as well as moral principles of how to interact with nature (see 2.1.2).

Consequently, when considering the values of nature, one also needs to understand what 'nature' refers to. In this assessment, nature is recognized as a socially constructed concept; its various understandings and interpretations are underpinned by knowledge systems, cultural backgrounds, and languages (see Annex 1.1). For IPBES, nature refers to the non-human living world, including the scientific categories of biodiversity, ecosystem structure and functioning, evolution, the biosphere, humankind's shared biological evolutionary heritage and biocultural diversity (Díaz *et al.*, 2015a). In addition, IPBES recognises alternative worldviews, such as those from indigenous peoples and local communities, in which people may recognize the diverse entities and elements of nature, such as rivers, mountains, plants, and animal species, existing on the planet, and denote them by other categories that imply different ways of conceiving the world, like Mother Earth and systems of life (Coscieme *et al.*, 2020; IPBES, 2021). Also, in many cultures and traditions, nature is often understood as inextricably linked to humans, not as a separate entity (e.g., de Castro, 1998) (see Chapter 2). Due to the wide range of potential interpretations of nature as a concept, the idea of nature's values becomes even more challenging. This assessment recognises the diversity of values that emerges from the very different ways of perceiving, understanding, experiencing and relating to nature.

Whilst the main focus of this assessment is on the values that reflect society's relationship with nature, the findings often highlight how these are intertwined with values that define human relationships with each other (see Chapters 2 and 5). Which kind of human-human relationships are prioritised within a society shapes the ability to express and act on different ways of valuing nature (see Chapter 2). For example, the assessment finds that values centered in strong individualism present a barrier to valuing nature as a common pool resource (see Chapter 5). Such human-human relationships are inscribed in institutions (i.e., societal conventions, norms and rules) in ways that largely influence what values and whose values of nature are seen as legitimate and thus can gain traction, and which ones are made invisible in everyday environmental decision-making (see Chapters 2 and 4).

The different chapters of the assessment have explored, when deemed feasible, some of the very different ways in which people value nature. The complex ways in which social-ecological context, ethnicity, affluence, societal role, cast, body capabilities, gender or age play out in the types of values held and expressed has still to be further explored. Also, the ways in which the rich and rapidly evolving intersectionality (e.g., as in youth global movements and the LGBTIQ+ community) is related to the diverse values of nature poses challenges beyond the reach of this assessment.

An operational typology of the values of nature

Given the diversity of worldviews, knowledge systems and disciplines, it is challenging to define nature's values in a universally intelligible and acceptable way. A comprehensive typology of the diverse values of nature can help guide decisions that affect nature and its contributions to people in diverse contexts. To understand and express the diversity of nature's values, the assessment presents a values typology

(Figure 1.3), (see 2.2). The typology encompasses different value dimensions and types, including overlapping *layers* of worldviews (and their underpinning knowledge systems, languages and cultures); broad values (i.e., life-guiding principles) and specific values (i.e., instrumental, intrinsic and relational values); and value indicators (i.e., biophysical, economic and socio-cultural indicators) and preferences.

Worldviews are ways through which people perceive, conceptualize and modify the world, rooted in cultures and languages (Olsen, 2019). Worldviews shape individual and collective ways of perceiving, interpreting and interacting with nature, and are expressed through culture, knowledge systems and languages. Worldviews can stem from diverse and often implicit assumptions about how nature and values can be known. They can also guide perspectives on how we conceive, relate to and act upon nature based on underlying value systems (e.g., human-nature worldviews). Worldviews, thus, represent the filters through which people evaluate the world and what they consider to be important in life (Manfredo *et al.*, 2020; Olsen, 2019) (see 2.2.1). Knowledge systems are dynamic bodies of holistic social and ecological knowledge, practices and beliefs, pertaining to the relationship of living beings, including humans, with one another and with their environment (see 2.2.1). Languages capture, maintain, transmit and convey values, knowledge and practices that support biodiversity and nature's contributions to people connected to specific places and territories, species, ecosystems and landscapes. Linguistic diversity may be used as a proxy for both cultural and values diversity (see 2.2.2).

Figure 1 3 **A typology of concepts about nature's values (further developed in Chapter 2).**

Broad values refer to people's life goals and general guiding principles towards the world that are informed by their worldviews (Dietz *et al.*, 2005). Examples of broad values include moral principles, such as justice, belonging, and freedom, but also life goals, such as enjoyment, health, and prosperity. Broad values influence specific values and provide them with a general context and meaning (Kelbessa, 2005) (see 2.2.3).

Specific values reflect the opinions on or judgements of the importance of specific things in particular situations and contexts. There are three main types: i) instrumental values, which denote that something has value as a means to an end, and that it is, in principle, substitutable (Pascual *et al.*, 2010); ii) relational values, which denote something whose worth originates from the relationships humans have with nature or with other humans through nature (Chan *et al.*, 2018); and iii) intrinsic values, which denote something has value as an end-in-itself or has inherent or moral value that is not tied to human purposes (Devos *et al.*, 2019) (see 2.2.3).

Values can also be understood as **indicators**, which are the quantitative measures (e.g., monetary and non-monetary) and qualitative preference ranking and ratings, perceptions and ILK narratives, that can indicate the importance of nature to people. Sometimes value indicators may be assumed to be directly comparable (i.e., commensurable), if one indicator category is used to express different types of specific values; in other cases values may be considered incommensurable, which means they cannot be directly compared with one another (Wallace *et al.*, 2021) (see 2.2.4). In this assessment, it is recognised that some values can be compatible, even if they are not measured by the same metrics. Valuation provides ways to bring together the underlying data on values to allow comparisons (see 3.2.2). There are also cases in which different value types are neither directly comparable nor compatible and must be considered in parallel (Kronenberg & Andersson, 2019) (see 2.2.3.3).

The different types of values can coexist. In other words, people can hold values across the different value domains (e.g., broad or specific values) and have multiple values within each category (e.g., instrumental, relational and intrinsic values). Further, there is a dynamic relationship between the different value domains. For example, worldviews may help to shape an individual's broad and specific values, while those broad and specific values may also inform peoples' worldviews (see 2.3.2, 2.5).

Values are not static and may be formed or change at different stages of people's life and in different contexts. Broad values are considered to be more stable, largely forming in early stages of life (e.g., childhood, early adulthood) (Schwartz, 1992), but they can be modified in the face of significant life events or socio-ecological shifts (Kendal & Raymond, 2019; Manfredo *et al.*, 2017). Specific values are by definition malleable and adapt to changing contexts (Amel *et al.*, 2017) (see 2.5). Further, the way values are expressed in decisions can also change. For example, power relations between different actors can influence what values are taken into account in the decisions made and influence the resulting outcomes (Vatn, 2015) (see 2.4.2, 4.4, 4.5).

To assist in identifying the multiple ways in which people value nature, the assessment presents four general life frames. These frames can help decision-makers organize the various ways in which nature matters to people (O'Connor & Kenter, 2019) (see 2.3). For example, in the *living from nature* frame, nature is seen as a resource that contributes to, and provides conditions for human sustenance and prosperity. The *living with nature* frame sees nature as non-human, with its own interests, ecological processes or wild spaces, emphasizing stewardship and responsibility towards nature. The *living in nature* frame considers nature as land and landscapes, emphasizing belonging and place identity. In the *living as nature* frame, there is no separation between humans and nature; people are understood to be connected to nature physically, mentally or spiritually. This frame emphasises interdependence and reciprocity. As an example of how values may differ across life value frames, a forest may simultaneously be seen as a useful resource for harvesting timber (*living from*), a harbour of biodiversity and carbon sink (*living with*), a cultural landscape (*living in*) or as an inseparable part of one's body or of the ecological identity of a community (*living as*). The life frames are not necessarily mutually exclusive. Both individuals and collectives can harbour multiple frames, though any given frame may be emphasized in a particular situation.

1.2.2 The role of valuation to elicit and capture the values of nature into decisions

Decision-making about nature can be better informed when the relevant values about what is at stake (and for whom) are known. This is the ultimate goal of conducting valuations of nature: to determine in which ways nature is valuable and for whom, in order to enable better governance (CBD, 2010; Daily *et al.*, 2009; Pearce & Moran, 1994; TEEB, 2010). Valuation generally entails the use of agreed-upon procedures for assessing the value of nature that stem from a given knowledge system, tradition or discipline (see 3.1.1).

Valuation provides key knowledge about the values of biodiversity, species, ecosystems and landscapes, as well as on their contributions to people. Valuation can be used by different actors. For example, a government can conduct and uptake the results of valuation to assess the societal

benefits and costs of alternative developmental options that may impact different facets of nature (see Chapter 3). An indigenous community can conduct valuation as a tool to elicit community members' perspectives about the use and management of biodiversity in connection to a territorial management plan (see 3.2.4).

'Valuing' is the act of assigning a value to something. Thus, while we all go through the process of valuing as a basis for our day-to-day decisions, valuation is considered in the assessment as an exercise that is undertaken to intentionally determine the values of nature, often to understand the values at play and to inform decisions (see 3.1.1). A focus of the assessment is identifying decision-making contexts in which "valuation" is necessary and/or sufficient for governance of nature, given that *valuing* is ubiquitous in individuals' choice-making (Laurans *et al.*, 2013; Vatn & Bromley, 1994) (see Chapter 4).

Valuation methods are the specific techniques or procedures that are used to gather, analyse and make explicit information related to the importance of nature to people. *Valuation approaches* are sets of principles and theoretical frameworks that guide how the valuation is conducted and what rules inform a given method. For instance, a focus group discussion can be used as a valuation *method* that adheres to a participatory *approach* to valuation. Since valuation is conducted in a wide range of socio-ecological contexts for a range of decision-making purposes, a wide range of methods and approaches exist (see 3.1, 3.2).

Different valuation methods and approaches can be used to generate information about the importance of specific facets of nature to people (e.g., crop values, recreational values, place values, etc.), the domain of the values themselves (e.g., worldviews, broad values, specific values), and the instances in which values are expressed (e.g., policies, rules, traditions, markets, behaviour, arts, etc.) (see Chapter 3). Some examples of methods used for valuation have been developed in the field of economics (e.g., choice experiments, travel cost, etc.) (OECD, 2018; TEEB, 2010), while other disciplines, such as ecology, geography and political science, have employed a range of different methods (e.g., participatory mapping, deliberative methods) (Chan & Satterfield, 2020). Each of these methods and approaches can be used to elicit different types of values (see 3.2.2). Valuation methods and approaches are also applied in IPLC contexts to assess values, often manifesting as cultural practices that require specific protocols and procedures to be followed for gathering, assessing and validating the information obtained (see 3.2.4).

Designing valuation attuned to specific socio-ecological contexts

The successful implementation of valuation depends on three broad types of considerations: relevance, resources, and robustness **(Figure 1.4)**. The *relevance* of valuation entails ensuring that all the values at stake are accounted for. Valuation also requires time, financial, technical, human and political *resources*. Resource availability determines to a large extent the feasibility of the application of the different valuation methods. Methodological *robustness* is also a prerequisite for generating useful information for decision-making and entails following best practices that guarantee transparency, theoretical consistency and accuracy (see 3.3.1, 3.3.2, 3.3.3).

A common challenge in valuation is how the values of different individuals or groups are represented in decision-making. One way to do this is by *aggregating the values* expressed by different individuals and different social groups to the societal scale into so-called "social values". Social values, however, may mask the values of minorities or less powerful groups (Howarth & Wilson, 2006). Alternatively *values can be scaled up through* deliberative processes to form "shared values" (Kenter *et al.*, 2016). These two

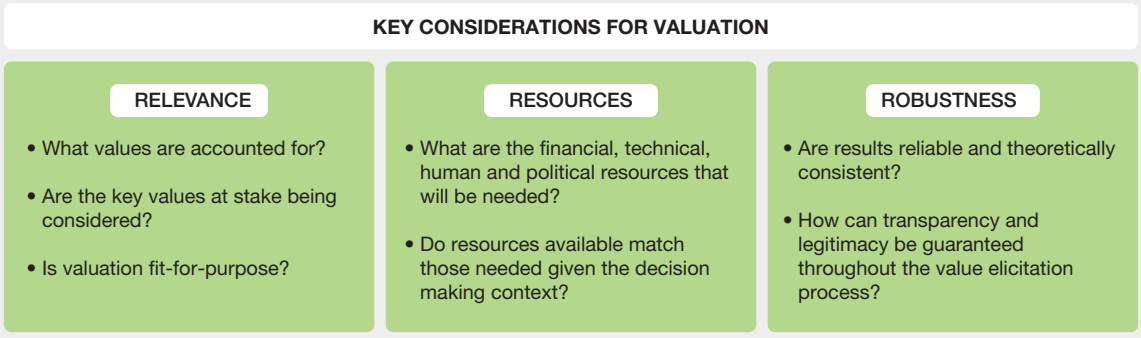


Figure 1 4 **Key considerations when conducting valuation.**

strategies may be seen as complementary (UK NEA, 2014) (see 2.4.2.1).

Given the diversity of nature's values, valuation processes can be described as more or less plural. A *more plural valuation* is one that considers and makes visible a wider diversity of world views, value frames, broad values and specific values. It is one that considers a wider diversity of foci of valuation, including biodiversity, nature's contributions to people, and good quality of life. It can also entail bringing together or integrating these diverse types of values (see 3.3.1, 3.3.1.3) (Jacobs *et al.*, 2018).

Given the diversity of stakeholders potentially affected by a decision, valuation can be participatory to a lesser or larger degree. Lower levels of participation entail the consultation with participants to retrieve information about the values of nature. High levels of participation entail engaging the relevant stakeholders throughout the process, ranging from design and operationalization to communication of the results of valuation (Arnstein, 1969). Deliberative valuation is an interactive valuation process. It entails bringing different actors together to build a shared value judgement about nature, a policy or a management issue. The deliberation process entails an open, and often iterative, dialogue among the stakeholders (Kenter *et al.*, 2011; Wilson & Howarth, 2002) (see Chapter 3).

Valuation can be more effective if it is aligned with the actual purpose of *decision-making*, if the valuation objectives address the knowledge needs of specific socio-ecological and decision-making contexts, and if it addresses the trade-offs between reliability, robustness, and available resources (see 3.3.4). Valuation can be used at different stages of an issue's attention or policy cycle (see 4.2.3, 4.6.2) (IPBES, 2016a; Jann & Wegrich, 2007; Tomich *et al.*, 2004). Valuation can be used as a negotiation support tool involving an iterative cycle of sustained feedback between stakeholders and decision-makers (see 4.2.3, 4.3, 4.6) (Zafra-Calvo *et al.*, 2020).

The particularities of the decision-making context, including the complexity and stakes of the specific decision to be taken on species, ecosystems, or other landscape elements and processes, determine key choices in the valuation process **(Figure 1.5)**. The degree of complexity of the decision-making context (horizontal axis) is to a large extent determined by the diversity of stakeholders and values, and by the level of uncertainty being faced. The nature of the stakes of the decision (vertical axis) is determined by the reversibility of the decision, the potential magnitude of its impact on people and nature, and the extent to which the interests of actors are aligned. Drawing on Funtowicz and Ravetz (1993), the role of valuation can be interpreted in relation to decision-making contexts that may be described in relation to different combinations of the above elements.

Decisions facing relatively low *complexity* and low *stakes* (see lower left corner of **Figure 1.5**) may not even require valuation. This could be, for example, because *uncertainty* is low given a wealth of prior experience making similar decisions, or because the outcome of the decision is easily reversible, meaning that any undesirable consequences can be quickly corrected. Decisions under intermediate complexity and stakes may benefit from undertaking singular forms of valuation involving a reduced set of stakeholders with well-aligned values. Decisions under high complexity and high stakes are better informed by more plural participatory valuation. As complexity increases, more diverse and incommensurable values held by a greater diversity of actors typically lead to higher uncertainty. As stakes also increase, decisions can be harder to reverse and have deeper impacts on people and nature (see 3.3.4).

There are different ways in which valuation can play out in decisions at high levels of complexity and stakes. One way is for dominant actors to impose their own values and preferred valuation methods and approaches, seeking to simplify the narratives about the situation at stake, which may lead to the exclusion of the other values at stake (see 4.3). Conversely, decision-makers may embark on the use of more plural and participatory valuation methods that lead to building a collective understanding of the decisions at hand, for example through deliberative processes (see 3.3.1.3, 4.6). In the latter case, more plural, participatory and deliberative valuation methods may be expected to be associated with higher transaction and administrative costs, in consonance with the level of increase of complexity and stakes. Yet when valuation is fully embedded in the issue (policy)-cycle, the relative cost of undertaking such a plural and participatory valuation approach could significantly diminish (see 4.2, 4.3, 4.6).

1.2.3 Expression of values in decision-making

Which values dominate or are emphasized in decision-making and which ones are marginalised or excluded depends on the type of decisions, the types of decision-makers (actors) and the type of interaction among the actors (see 2.4.2) (Vatn, 2015). Prioritisation of certain values in decision-making greatly influences which issues do and do not become part of the agenda, as well as which decision-makers are considered socially legitimate to participate in different types of decision-making processes (see 4.3, 4.5). This prioritisation affects nature and people's relationships towards nature. While decision-making is not directly mentioned in the IPBES conceptual framework (Díaz *et al.*, 2015a), it is implicit in the box "institutions, governance and other indirect drivers", as decisions shape institutions, while institutions shape decisions. It is thus important to explicitly unpack the "black box" of decision-making in the

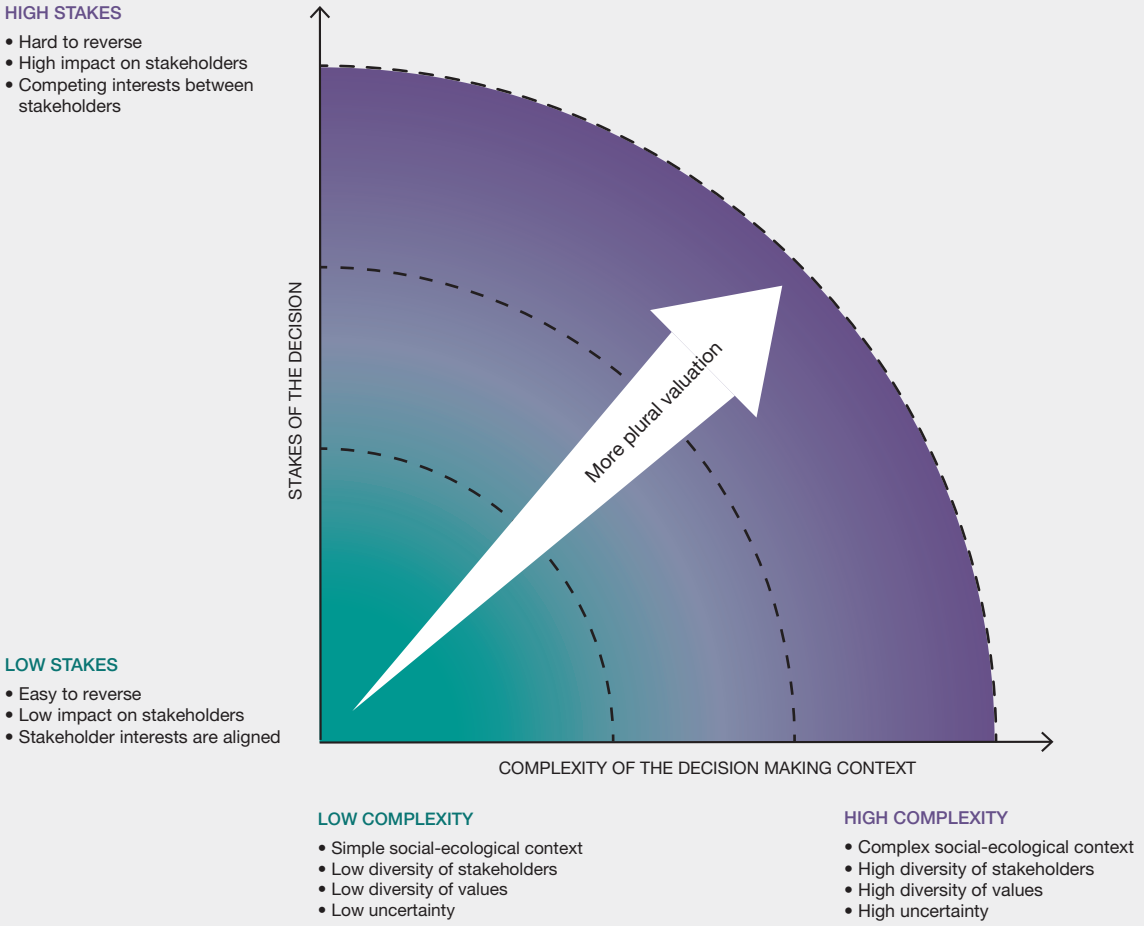


Figure 1 5 **Valuation, plurality and complexity. The plurality of the valuation needed depends on the complexity of the decision-making context and the stakes of the decision (modified from (Funtowicz & Ravetz, 1993)).**

IPBES conceptual framework to provide coherence to the values assessment with regard to the relationships between decision-making, values and valuation.

A decision-making typology (DMT) is developed in the assessment to facilitate a structured understanding of the ways in which certain values get prominence when different types of decisions are made by various types of actors **(Annex 1.3)** (see 2.4). Three general types of actors (political, economic, and civil society actors) and three broad types of decisions in which different values of nature are expressed (political, economic and socio-cultural decisions) can be distinguished (Dryzek *et al.*, 2006; March, 1994; Pröpper & Haupts, 2014). This typology is necessarily fluid and applies in different ways to the same individuals depending on the specific context. For example, an individual may serve as a political actor (e.g., member of a municipality board or village representative), while also operate as an economic actor (e.g., as a farmer producing food and/or as consumer; owner of a private firm or cooperative, etc.), and yet in other contexts may also act as a community member/citizen (either in an unorganised way as part of a social movement or as member of a civil society organisation, e.g., trade union, non-governmental organisation, etc.) (Duraiappah *et al.*, 2014). The decision-making typology is structured in a way to help shed light on these sometimes fuzzy and overlapping relationships.

The assessment regards *political actors* as those that serve the *public interest* and have the authority to define rules for economic activity (e.g., property and use rights, regulations – as well as forming the rules for policymaking itself). *Economic actors* such as producers and consumers are those actors who hold rights to different assets, including natural assets used for economic purposes. *Civil-society actors* represent the breadth of civil society and are structured around a set of goals that serve the interests of a collective and can be structured through membership-based organizations or as social movements (Annex 1.3) (see 2.4.2).

Political decision-making is regarded as that which defines and protects rights regarding who has access to and control over natural assets and associated nature's contributions to people (Bozeman, 2007). *Economic decision-making* covers decisions mainly about production and consumption of goods and services, as well as investments and disinvestment in natural assets (Bromley, 2006). *Socio-cultural decision-making* or processes refer to other aspects not covered by political and economic decisions, including a cultural dimension in the sense of forming, maintaining or changing the socio-cultural identity of people (e.g., sense of place), and a dimension about maintaining (or challenging) existing human-nature relationships beyond material livelihood aspects (e.g., taking care of nature for its own sake) (Comberti *et al.*, 2015) (Annex 1.3) (see 2.4.2.3).

Actors can interact with each other in different ways, for example, trading, cooperating with each other or acting in conflicting ways. These interactions influence which values are expressed, especially due to the power relations among the actors (Chaudhary & Kastner, 2016; Ostrom, 2005; Temper *et al.*, 2018). The values assessment looks at how types of decisions, types of actors and their interactions affect value expression in decision-making.

The analytical framework of the assessment addresses any type of decision **(Figure 1.6)** (Annex 1.3) (see 2.4.2, 4.3, 6.5.3, 6.5.4). Most of the empirical evidence evaluated concerns decision-making by the public sector and indigenous peoples and local communities. Decisions by the corporate sector have not been equally emphasized in the assessment.

Values are expressed at all stages of the decision-making process; however, the way they are expressed differs between stages. Values are expressed by having *the power to decide* on which actors can make decisions on a given issue, and with which other actors an actor can or should engage with in decision-making. Such decisions are based on an *a priori* value assessment on who should have a say (see stage 1 in **Figure 1.6**). Additionally, values are expressed by *establishing what is deemed as the legitimate way of interaction* between actors (stage 2) and by establishing the *priority areas of decision-making*, for instance the need for a governance framework for a certain societal issue or identifying areas where rules for use and management of natural assets might have to be changed (stage 3) (see 4.3). Values are also expressed when identifying the possible solutions (stage 4). When actors

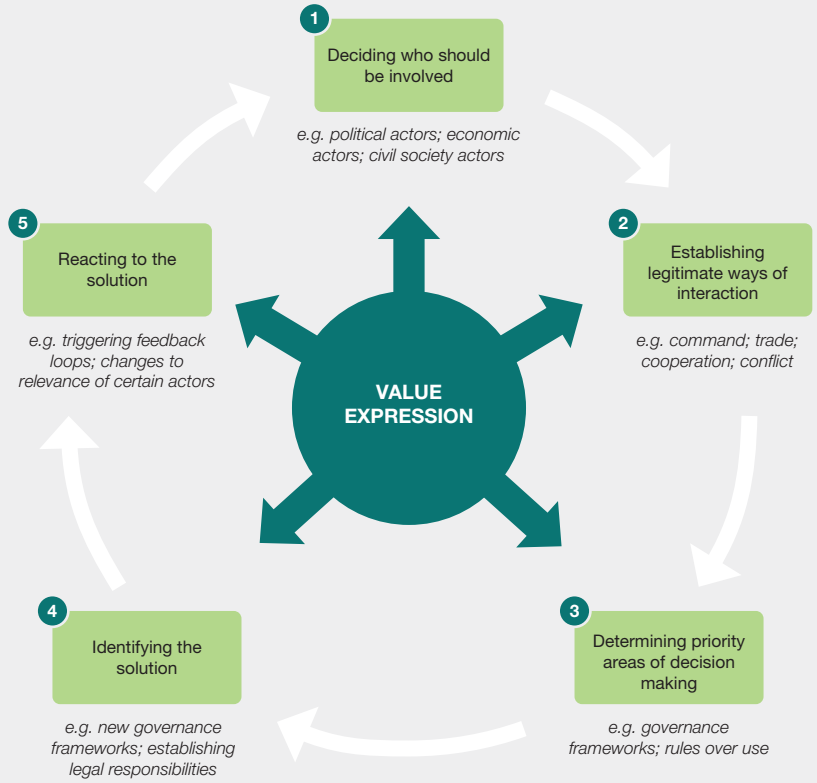


Figure 1 6 **Values in an environmental governance framework. Values are expressed in different stages of the decision-making process (see more details in Annex 1.3).**

react to the decisions made values are (re)expressed, which in turn can trigger feedback loops affecting the original decision and changing the relevance of certain actors and their interactions (e.g., from conflict to cooperation) (stage 5). What socio-ecological outcomes can be expected of an actor's or group of actors' decisions on nature depend on the choices at all stages of decisions as impacting the expression of values (see 4.4.2, 4.4.3, 4.4.4, 4.4.5). The phases of decision-making where values are expressed are typically neither linear nor clearly demarcated, but instead part of a complex decision-making cycle **(Figure 1.6)** (Annex 1.3) (see Chapter 2, 4.2.3, 4.3, 4.6, 6.5.5).

1.2.4 The role of values and valuation for sustainability and justice

There are diverse understandings of the concept of *sustainability*, which stem from different cultural contexts (see Annex 1.4) (Seager, 2008). For some, sustainability emphasises the need for sustaining biodiversity and life support functions on the planet. For others, sustainability refers to sustaining nature's contributions to people that enhance people's livelihoods and quality of life. Sustainability can also entail maintaining or managing landscapes as well as relations of connectedness and reciprocity with nature. In the scientific literature, sustainability refers to development trajectories that stay within critical socio-ecological thresholds, in which current and future generations can meet their needs, rights and aspirations (e.g., United Nations, 1987; WCED, 1987). This notion is embedded in the Sustainable Development Goals (SDGs), which provide a framework that allows for the consideration of synergies and trade-offs between the objectives of poverty alleviation, environmental protection, human well-being, economic growth, and peace at the global scale. The framing of the SDGs provides an opportunity to explicitly recognise and include the diverse values related to nature, nature's contributions to people and good quality of life in a myriad of socio-ecological decisions through various approaches, policy support tools and instruments (see 6.5.1). The worldviews and ways of life of indigenous peoples and local communities emphasise other notions of sustainability; for many of them, sustainability relates to past and future generations' ability to maintain reciprocal relationships with the land, species, ecosystems and natural processes (Fernández-Llamazares & Virtanen, 2020; Whyte *et al.*, 2018) (see 2.2.2).

Following the United Nation's sustainable development perspective (United Nations, 1992), also embedded in the SDGs, the values assessment considers the concept of *sustainability as positively related to justice* (see Chapter 5). Societal progress will be sustainable only if it is just, and vice versa (Leach *et al.*, 2018; Swilling & Annecke, 2012). The assessment thus aligns with the United Nation's vision of *'leaving no one behind'*, which states that 'horizontal inequalities' between social groups and 'vertical inequalities' such as inequitable distribution of wealth and power, hinder progress towards sustainability because these destabilise societies in ways that obstruct environmental governance (United Nations, 2017).

There is a large body of research literature that documents the interconnections between sustainability and justice (Leach *et al.*, 2018; Lele *et al.*, 2018). The link between environmental crises and social injustice has also been emphasized by the climate community (IPCC, 2019; Klinsky *et al.*, 2017) as reflected in the IPCC Special Report on Global Warming of 1.5°C (Masson-Delmotte *et al.*, 2018). Countries with larger economies and larger populations contribute most to the generation of greenhouse gases in absolute terms while the wealthiest countries contribute most in terms of per capita emissions. At the same time, the impacts of heatwaves, droughts and heavy rainfall on people's livelihoods will imply higher risks in the tropics and subtropics where people are more vulnerable than in the generally richer temperate zones. Environmental degradation causes injustices, for example where impacts fall disproportionately and unfairly on economically, culturally and politically marginalised and historically disadvantaged social groups, including afro-descendants, women, indigenous peoples and future generations (Bullard, 1990). On the other hand, injustices deepen and perpetuate environmental degradation, for example by enabling more powerful actors to continue to shield themselves from the environmental consequences and costs of their actions. In this vein, sustainability is linked to both intra- and inter-generational justice, with the protection of future generations being at the very heart of sustainable development (e.g., Norton, 2005; WCED, 1987). This entails that addressing social injustice has major implications for the kind of responses needed for transformations to sustainability (see 5.1).

The values assessment interprets justice and equity through three dimensions (Martin, 2017; Schlosberg, 2004) (Annex 5.1) **(Figure 1.7)**. *Distributional justice* refers to the equitable distribution of the benefits derived from biodiversity and nature's contributions to people. Social groups have differentiated access to nature's contributions to people, which affects their quality of life. Some groups are disproportionately vulnerable to losses of nature's contributions to people, for example smallholder farmers who suffer from increasing crop pests (Morton, 2007), whilst future generations will suffer from the loss of the options associated with biodiversity loss (Faith, 2021). Similarly, some social groups may be disproportionately affected by biodiversity conservation policies. For example, throughout the 20th century, local and indigenous peoples have lost their territories or access to natural resources as a result

of protected area management practices (Brockington & Igoe, 2006).

Procedural justice refers to the fair inclusion of all voices in decision-making processes. For example, women's values have been marginalised from environmental policy making, despite women being disproportionately affected by climate change (Buckingham & Kulcur, 2009; Denton, 2002). Also, future generations may not be represented in policy decisions today that will affect their lives in the future. There is also growing concern for how to provide justice for other-than-human entities such as rivers, mountains, and species, through representation of their interests in environmental decision-making (see Chapter 5, 5.1, 5.3, 5.5) (Starik, 1995; Strang, 2020).

A third aspect of justice, *recognition* of diverse ways of knowing and valuing nature, relates to acknowledging and respecting the rights of social groups to their traditions and cultural diversity, and in particular, to the different ways they relate to nature (see Chapters 2, and 5 – 5.1) (Whyte, 2011). To assert a dominant view of what is and should be valued (what we consider worthy of protecting) by excluding what others consider valuable, is a form of injustice (Sikor *et al.*, 2014). These ideas are connected to epistemic injustice, which is generally thought of as discrimination against marginalised, ways of knowing nature (see Chapter 2) (Coulthard, 2007; Vermeylen, 2019).

The values assessment provides evidence that many values, but not all, align with sustainability objectives, including those embedded in the SDGs (see 2.2, 5.2 and Chapter 2). Sustainability-aligned values refer to those broad values or societal principles (e.g., care, unity, reciprocity and justice) that underpin visions of more sustainable outcomes such as those included in visions associated with the SDGs (see 2.2, 5.2 and Chapter 2). The values assessment explores how institutional change that mobilises sustainability-aligned values can have profound impacts by allowing people to act in accordance with their existing pro-environmental values (see 5.3). Such mobilisation requires effective systems of governance, facilitating empowerment, societal learning and institutional change in ways that enable more diverse and sustainability-aligned values to be widely taken up in practice (see 5.3, 5.4).

Justice and power are strongly interconnected (Annex 2.1). Historical socio-cultural, political and economic processes have shaped current power relations in society (Bennett & Satterfield, 2018). Power asymmetries underpin the

Figure 1 7 **Justice is inextricably associated with sustainability.**

inequitable distribution of access to and control over natural assets and nature's contributions to people (see Chapters 2 and 4). Actors who have the capacity to make rules on the legitimate ways of relating to nature, who can benefit from nature's contributions to people in which ways, and who bears the cost of ecosystem degradation. In so doing, powerful actors can influence to a great extent procedural justice, by deciding who is included or excluded from decisions about nature (see Chapters 2 and 4). In addition, the power to frame environmental issues in a certain way, i.e., the discourses and the types of knowledges recognized as legitimate (Muradian & Pascual, 2018), can be used to undermine or foster recognitional justice, by privileging the ideas, languages and interest of some groups to the detriment of others (see Chapters 2 and 4).

1.3 VALUES AND VALUATION AS LEVERS FOR TRANSFORMATIVE CHANGE

Biodiversity loss continues unabated due to a powerful mix of direct and indirect drivers, as documented by the IPBES regional, thematic and global assessments and the reported failure in achieving the CBD Aichi Targets (IPBES, 2016c, 2018a, 2018b, 2018c, 2018d, 2019). Currently, decision-making that focuses on reversing negative environmental trends is mainly focused on coping with the negative consequences of deterioration of nature and nature's contributions to people by attempting to nudge human activities away from current deleterious practices. But it is increasingly recognised that *transformative change*, i.e., system-wide reorganizations across technological, economic and social factors, including paradigms, goals and values associated with the ways we relate to nature, is required to achieve more just and sustainable futures (IPBES, 2019).

Similar calls are being made about the need for transformative change to address the health impacts derived from biodiversity loss and ecosystem degradation. The emergence of the COVID-19 pandemic is a case in point. Despite evidencing the connection between biodiversity and health, there is still more political interest in reactive measures based on economic and technological solutions to dealing with pandemics after they have already occurred, rather than integrated measures focused on addressing the drivers of land use change, increasing zoonotic emergence, and the development of proactive institutional logics (IPBES, 2020). This phenomenon can be framed as "single loop learning" (Argyris, 1991): as problems arise from environmental mismanagement, attempts are made to fix them, rather than addressing the underlying causes. Aiming for more just and sustainable futures requires a "double loop learning" to not only attempt to fix the symptoms of environmental mismanagement, but instead question and address the values, goals, decisions, practices and institutions that created the conditions for the environmental problems to arise in the first place.

The values assessment provides evidence to suggest that the type of transformative change needed to move towards more just and sustainable futures require a set of complementary strategies that can activate key leverage points centered around values and valuation of nature (see Chapters 3, 4, 5 and 6). The first strategy is to adequately *recognize the values of nature* by undertaking valuation and uptaking it into policy decisions (see Chapters 2, 3, 4 and 6). This means making explicit in economic and policy decisions how nature underpins human well-being, through the approaches developed (see e.g., Dasgupta review, (2021); TEEB (2010)), as well as using the wide diversity of valuation methods and approaches that are currently available (see Chapter 3). The second strategy is to *meaningfully include the diverse values of nature into decisions*, by embedding valuation into inclusive decision-making processes (see Chapters 3, 4 and 6). This entails designing valuation processes that are well attuned to the specific social and ecological context at stake (see Chapter 3) and respond to the specific needs of the different stages of the decision-making process (see Chapter 4), in ways that adequately represent the diversity of values involved (see Chapters 2, 3, 4 and 6). The third strategy requires institutional change based *on reformulating policy and regulations* to meaningfully consider nature's diverse values (see 5.3, 5.4, Chapters 4 and 6). This requires creating space to allow for the diversity of values to be expressed in decision-making (see value expression **Figure 1.8**) and fostering coherence in implementation of policies and related decisions across various scales and jurisdictions by addressing value trade-offs (see 6.3.1, 6.3.2). The fourth strategy focuses on *shifting personal beliefs, values and paradigms* that underpin how people relate to nature and to each other in more just and sustainable ways. This is linked to individual and societal norms that shape what is considered to be just and sustainable and what kind of futures and development pathways can be envisioned as possible and desirable. Working with values to eventually change the core goals and intent of society is ultimately necessary for the kind of profound, system-wide change that is required (see 5.3). The assessment provides evidence of the importance of these four strategies, and yet how far short society is in terms of activating value centered leverage points around these strategies (see Chapters 2, 3, 4, 5 and 6).

Activating the leverage points towards sustainability pathways requires transformative governance, i.e., a governance system which combines integrative, inclusive, adaptive and pluralist approaches to trigger, manage and respond to system-wide and cross-scale transformations

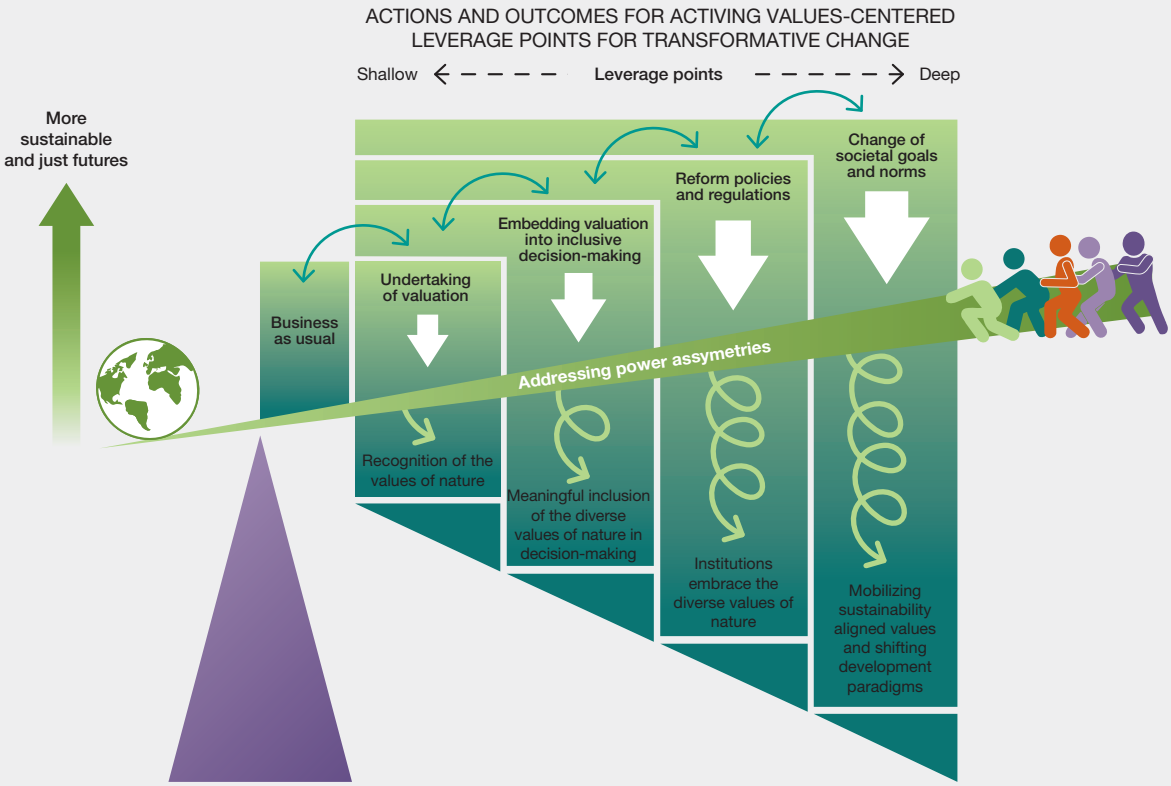


Figure 18 **Values-centered leverage points for transformative change towards sustainability and justice.**

(see 6.1) (Visseren-Hamakers *et al.*, 2021). The values assessment posits that addressing structural factors to mobilise sustainability-aligned values can be facilitated by a more pluralistic perspective on human-nature relations. This can be accompanied by the recognition and elicitation of multiple values of nature and the deployment of appropriate valuation approaches that fit the social, cultural, economic, political and biophysical context in which environmental problems need to be addressed. Doing so would support an effective mix of policy interventions, providing space for innovative and more inclusive approaches (see 6.2, 6.3). In addition, movements in this direction should be aligned with addressing current dominant institutional arrangements so that the new policy mix could thrive. In turn, facing this challenge would require that the interests that would actively counter such new policies, which are typically those that support business as usual, are kept in check.

Although several knowledge and operationalisation gaps exist that limit the elicitation of nature's values and the uptake of valuation results in policy decisions, developing motivational, analytical, bridging, negotiation, social networking and governance capacities can help overcome such limitations (see 6.4). The values assessment thus recognises the need to focus beyond simply improving managerial and technological interventions by means of valuation. Instead, the assessment proposes the need for more fundamental and deeper changes to societal institutions and structures that produce negative impacts on nature and unequal distribution of environmental benefits and burdens.

Shifting from "business as usual" pathways or trajectories towards more sustainable pathways requires acknowledging that alternative, more sustainable pathways exist, as well as addressing the drivers that underpin the current unsustainable trends. Alternative transformation pathways advocated for reaching a just and sustainable future, include among others: *Green Economy* (Dasgupta, 2021; TEEB, 2010; UNEP, 2011), *Degrowth* (D´Alisa *et al.*, 2014; Daly, 1996; Kallis *et al.*, 2020), *Earth Stewardship* (Chapin III *et al.*, 2009; Rozzi *et al.*, 2015) and *Nature Protection* pathways (Soulé, 2013; Wilson, 2016). These pathways prioritise different sets of broad values and different bodies of knowledge, although they all identify the need for more plural valuation of nature as a basis for a more sustainable relationship between people and nature (see 5.5). These alternative sustainability pathways are based on different sets of values. The Green Economy pathway is underpinned by prioritisation of nature's instrumental values, conceiving

nature as an asset for human well-being. The Degrowth approach emphasises values of sufficiency for shaping human use of nature. The Earth Stewardship pathway prioritises biocultural diversity, alongside broad values such as solidarity – both among humans and with other-than-human entities (see 2.2, 5.5). The Nature Protection pathway brings to the fore the need for care and empathy for nature, emphasises its intrinsic value, and argues that focussing on either instrumental or relational values alone will not result in the protection of nature. Whilst these alternative pathways differ in terms of the combinations of the values underpinning each of them, they also share broad values aligned with general notions of sustainability – these being a just and shared connected future cognisant of peoples' interdependencies with nature (see 5.5).

1.4 ACHIEVING ROBUSTNESS AND PLURALITY IN THE VALUES ASSESSMENT

Worldviews shape the overall framing and direction of any assessment effort. The values assessment draws on diverse knowledge systems and sources stemming from a wide range of scientific disciplines, as well as different knowledge types. It is thus important to reflect on the diverse backgrounds of the authors that have produced the assessment and how this has shaped the plurality of views portrayed in the assessment, as well as on the efforts made to integrate diverse knowledge sources and perspectives, including those of indigenous peoples and local communities (Annex 1.5 for a review of the assessment elaboration process and Annex 1.6 for the strategy for the inclusion and recognition of indigenous peoples and local communities).

1.4.1 Efforts to achieve robustness and plurality in the values assessment

The values assessment team of experts includes a high diversity of backgrounds. The members of the team (84 expert authors and 11 review editors, all selected by the Multidisciplinary Expert Panel) come from a broad set of academic disciplines including anthropology, biology, communication science, ecology, economics, environmental science, geography, law, philosophy, political science, policy implementation, psychology, and sociology. 18 authors are ILK experts, including two ILK holders. Over half of the experts have at least one degree in social sciences (one third of which are in economics), and over half have at least one degree in biophysical sciences. Ten percent have a degree in the humanities, and 7% in engineering. Two-thirds of the authors have changed disciplines throughout their academic careers, switching between biophysical sciences, social sciences, the humanities, engineering or a combination thereof. Experts are citizens of 47 countries from all regions of the world and speak 51 languages. The diversity of sociocultural and disciplinary backgrounds of the team is further enhanced by over 200 contributing authors (who are citizens of 49 countries from all regions of the world, and include 25 ILK experts and 12 are ILK holders) (Annex 1.5).

The values assessment used scoping, critical and systematic review methods (Grant & Booth, 2009; Moher *et al.*, 2009; Pham *et al.*, 2014) to identify, screen, select and evaluate over 13,000 sources of evidence. Complementary corpuses were also analysed using natural language processing (text analysis using artificial intelligence) to characterise broad aspects of the literature, covering more than 200,000 pieces of evidence.

The more than 13,000 pieces of evidence that form the main corpus analysed and cited in the values assessment include academic literature in 11 languages from a wide range of disciplines, grey literature including policy documents, artwork, magazines, newspaper articles, videos and websites, as well as direct contributions from IPLCs. While some documents date back to early 1900, most have been published since the year 2000[3]. The sources were identified through a diverse set of approaches including 39 different literature reviews with different search strategies and review protocols, including systematic reviews and case study analyses. Systematic reviews were complemented by expert knowledge to reach the literature that tends to be omitted in systematic reviews (for instance, grey literature or literature in languages other than English). Systematic reviews of grey literature, such as policy documents and consultant reports, were limited by the lack of publicly accessible and searchable databases. Different approaches and methods were also applied in the review of the different literature and in the ways to synthesize it. Deliberation was often used to develop consensus across disciplines within the expert team (Annex 1.5 for more details).

The literature reviews were complemented by two rounds of external review to ensure that the process of identifying, selecting and analysing information was as exhaustive as possible, given the resourcing of and team of experts available to the assessment. Workshops to review the different iterations were independently organized by academic (e.g., universities, research institutes, research networks), governmental (e.g., IPBES focal points) and civil society organizations (e.g., youth environmental networks) in many different countries. Also, three formal dialogues

3. These correspond to the Second Order Draft that was assessed during the preparation of the final draft of the assessment.

were held with ILK holders and experts, each lasting two to three days, to address their views and validate information presented across the assessment (see 1.4.2). This process is designed to ensure the assessment incorporates feedback from a wide range of actors, including member states, IPBES stakeholders, policymakers, ILK holders and non-IPBES experts.

1.4.2 Linking indigenous and local knowledge in the values assessment

Indigenous peoples make up around 6% of the global population and live in 90 different countries (Secretariat of the Convention on Biological Diversity, 2014). Besides indigenous peoples, 45% of the worlds' population live in local communities in rural areas. Indigenous peoples and local communities[4] (IPLCs) own, manage and/or occupy at least a quarter of the global land area under several property regimes (IPBES, 2019), including collective property regimes that have adapted and innovated rules and institutions, some of which go back centuries or even millennia (Ostrom & Hess, 2010). Indigenous peoples and local communities include a great variety of sociocultural groups who have their identity, livelihoods and knowledge systems usually directly tied to nature. These include the ethnic groups officially recognized as indigenous peoples, Afro-descendant communities, as well as local communities' groups such as farmers, fishers, herders, hunters, riverine communities, desert dwellers, and forest users attached to particular ecosystems in different parts of the world (IPBES, 2021) (see 2.2.1). In 2007, indigenous peoples rights were internationally recognized by the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (United Nations, 2007), which was signed by 144 member States.

IPLCs hold specific worldviews and place-based, detailed, knowledge of nature and about biodiversity, which is referred to as indigenous and local knowledge (ILK). For IPLCs, the constant struggle to keep their traditional practices, rights, languages, and associated values of nature, are major concerns for biodiversity conservation, nature's contributions to people and human-environmental well-being (IPBES, 2019). Also, concerns about equity and justice over their territories and resources are now one of the biggest threats IPLCs face, given the fast-paced environmental and climate change processes, as well as increased pressure and disputes over land and resources. In this sense, it is important to recognise how IPLCs make sense of the idea of the "values of nature" and acknowledge the need for flexibility in the use of appropriate, context-specific concepts and valuation methods and tools as currently used by IPLCs.

IPBES has worked with IPLCs and indigenous and local knowledge since its formation, from which important learning processes, experiences and practices of dialogue and co-production across knowledge systems have been synthesized into an approach to recognizing and working with ILK in IPBES (ILK approach), which was approved by the IPBES Plenary in 2017. This ILK approach includes four basic principles: 1) respecting rights, 2) supporting care and mutuality, 3) strengthening IPLCs and their knowledge systems, and 4) supporting knowledge exchanges (Hill *et al.*, 2020). In the values assessment we build on these previous efforts and protocols to develop a specific strategy to work with and recognize IPLCs and ILK, while expanding the mechanisms for their inclusion.

The values assessment strategy for the inclusion of ILK was led by a cross-assessment ILK-focused group, who collaborated in the development and implementation of a series of interconnected steps (Annex 1.6), and sources of evidence **(Figure 1.9)**, to make the values of IPLCs visible. The sources of evidence used in the values assessment included a broad spectrum of ILK harboured in different forms, formats and languages (e.g., community-based protocols, songs, artwork, etc), in addition to written materials and academic formats.

ILK-based evidence assessed across all chapters in the assessment relied on different types of approaches and was developed in three different stages **(Figure 1.9)**. 1) *Identifying main messages* regarding values of nature and IPLCs. Two face-to-face ILK dialogues were undertaken (Paris, France, March 2019; Calpulálpam de Juárez, Mexico, September 2019) with ILK holders and experts of the values assessment and guidance was provided by the IPBES ILK taskforce during the process. These dialogues helped delineate the messages relative to the visions of different IPLCs regarding the values of nature and fostered the exchange of ideas. 2) *Building the evidence* around those main messages. These included literature reviews by different chapters, tackling academic papers, synthesis reports and ILK sources documented in accessible written form, including compilations of literature and cases from other IPBES assessments and related reports. A global call for contributions, including community reports, declarations, academic papers, case studies, videos, songs, artworks, and materials in local languages,[5] was issued. Several ILK experts and holders participated as authors or contributing authors of the assessment. 3) *Validation process and*

4. Indigenous peoples and local communities (referred as IPLCs) is an umbrella term used internationally by representatives, organizations, and conventions to represent the most culturally diverse segment of the world's populations (IPBES, 2021). However, it is recognized that in particular contexts and situations it is more appropriate to treat them separately, as it is done in many sections of the assessment.

5. Call for contributions on indigenous and local knowledge (https://doi.org/10.5281/zenodo.4390417).

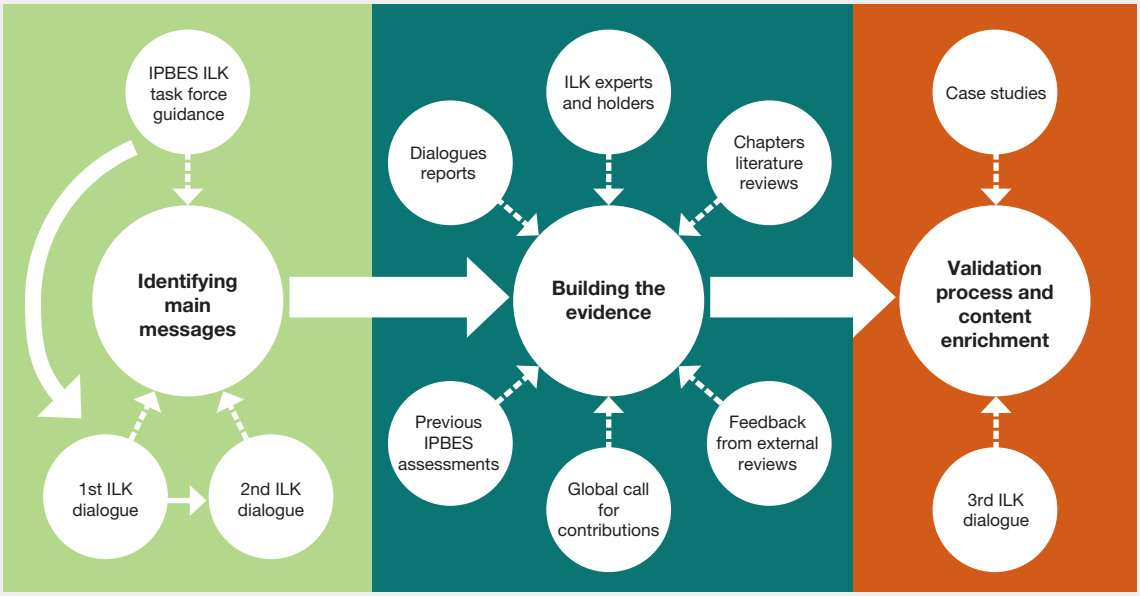


Figure 1 9 **Strategy and sources of evidence for the inclusion of ILK during the realization of the values assessment.**

content enrichment. One case study was developed across the chapters of the assessment to provide specific concepts, experiences and examples on the incorporation of ILK and IPLCs' values of nature into decision and policymaking. The case study explored the philosophies of good living[6] and how values are embedded in them, as well as how they inform decisions. A third ILK dialogue was undertaken online with the objective to discuss and refine messages related to IPLCs and ILK in the summary for policymakers.

1.4.3 The plurality achieved in the assessment (and its limits)

This assessment's authors recognize the diversity of knowledge and values represented within and across sociocultural groups and knowledge systems worldwide. This ranges from the worldviews, knowledges and values that are place-based and held by IPLCs (e.g., farmers, pastoralists, forest managers, and women's cooperatives) to regional and global insights by academics from different traditions, to the perspectives of policymakers at local to national scales, urban groups and emerging social movements formed around shared values (e.g., neighbourhood associations, youth international movements, landless movements and others). For instance, some indigenous conceptualisations of nature and their related values associated with kinship, reciprocity, responsibility and stewardship can provide important global lessons to address the current biodiversity crisis (Annex 1.6). This diversity is not understood as a dichotomy between IPLCs and western societies, between the global south or the global north, or between ILK or academic knowledge, but as a multidimensional network of "hubs" or clusters of shared knowledges and values, which may dynamically intertwine and hybridise, like strands in a woven patchwork **(Figure 1.10)**. These knowledge systems – which reflect and reinforce the worldviews, values and experiences of their holders and users – have guided and informed the daily decisions and actions of individuals, families, communities and others since time immemorial, and continue to do so today.

The capacity of the assessment expert team to perceive and represent this diversity is bounded by the conditions that underpin the production of the assessment. The approaches used and insights gained have been filtered by the IPBES conceptual framework, IPBES procedures (e.g., the use of systematic literature reviews) and structures (e.g., the disciplinary representation and organization of experts) that have guided the assessment. Only a part of the vast spectrum of diverse worldviews and knowledges could be reflected: grey literature, difficult to identify by using search engines, and governmental documents (e.g., policies, laws), not easily accessible, only represented a small fraction of the sources (11%) even after devoting important effort to avoid this bias (18 of the 39 literature reviews- see above).

6. Literature review for the philosophies of good living (https://doi.org/10.5281/zenodo.4399544).

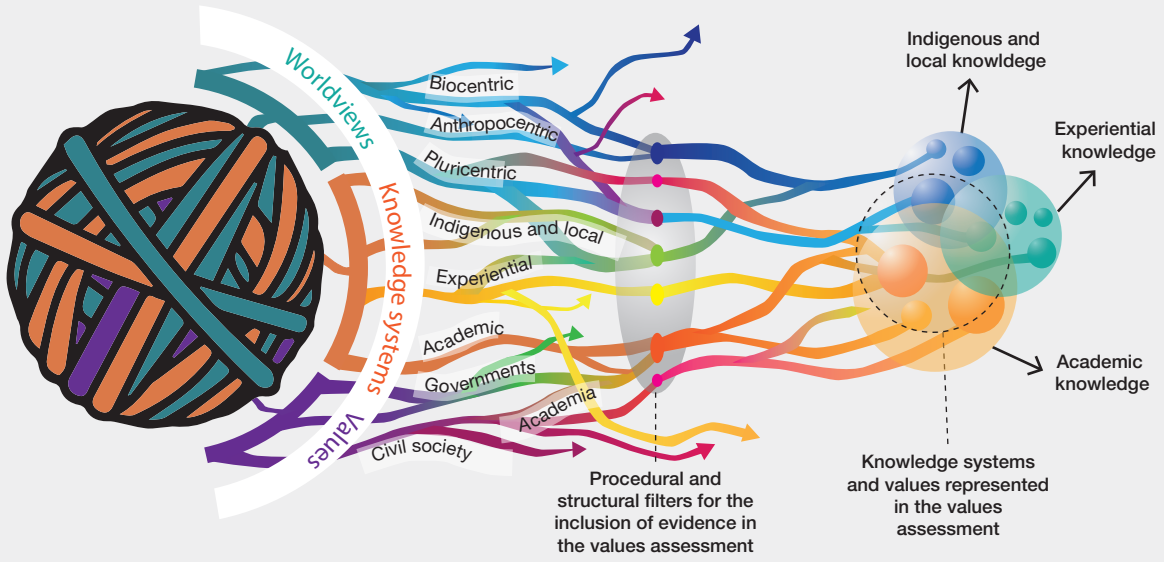


Figure 1 10 **The plurality achieved in the values assessment and its limitations. Representation of the multidimensional and dynamic nature of worldviews, knowledge and values, and how they get filtered through procedures, structures and evidence presented in the assessment.**

Some strands of knowledge and values intertwine, while others remain distinct. From this diversity, some "strands" are more prominently represented in the assessment, as is the case of academic knowledge. Adapted from Sillitoe (2006) and Tengö (2014).

A large share of the sources cited in the assessment (96%) were published in English, reflecting the rise of English as the *lingua franca* of global science at the cost of a global homogenisation and reduced plurality in cross-cultural science production and communication (Hanauer *et al.,* 2019; Ramírez-Castañeda, 2020). The literature cited presents information from all the regions of the world, but countries belonging to the Western Europe and Others Group (WEOG) were the most frequently represented (21%), and those from Eastern Europe were very poorly depicted (1.1%). A strong bias was found in the country of affiliation of the first authors of these sources, with a large proportion of them based in countries of the Western Europe and Others Group (73%), with very few of them based in Africa (4%) or Eastern Europe (1%). Reports from governments and civil society organizations, including non-scientific valuation exercises published in consultant reports, that constitute substantial "grey literature" only represent a limited fraction of the sources of the assessment (8%), despite having targeted several search strategies to these types of documents. Other types of knowledge, different worldviews, kinds of narratives and expressions about the values of nature have their own perspectives that are hard to be captured, for example, in written form. All these sources have unavoidably been interpreted through the scientific approaches of the team of assessment experts and IPBES procedures.

Regarding the conceptualization of nature-human relations, the types of values of nature, as well as valuation approaches and methods, IPLCs apply their own knowledge systems and conceptualizations, which do not usually align with the logic and procedures established by academia (see 3.2.4). The assessment provides the conceptual basis to recognise indigenous and local knowledge systems and to create mechanisms to elicit their values and to co-construct inclusive decision-making processes. Yet, the study of valuation by IPLCs is a relatively young field in academia and it has just begun to be explored by IPLC scholars (see 3.2.4). In the absence of IPLC conceptualisations, attempts to understand the knowledge, worldviews, values and approaches to valuations by IPLCs is subject to western science conceptualisations of nature, methods, evidence, and confines how other methods might be organised or what logics might inform them. The values assessment has significantly expanded upon previous IPBES approaches to its co-production with IPLCs, but still remains a process primarily framed by a western academic scientific worldview (e.g., written text, in English, encompassing mostly a western-science-perspective).

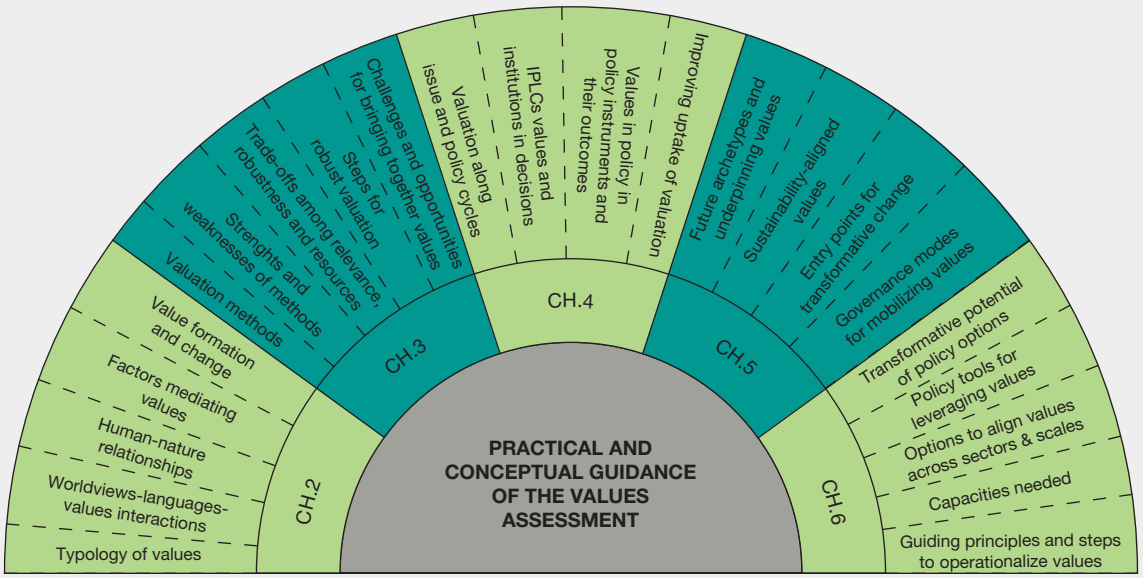
Importantly, academic sources used to incorporate IPLCs and ILK in the assessment do not necessarily reflect the worldviews, concepts and values held by these groups, as academic researchers may present interpretations of

reality based on filters from their own disciplinary fields or even personal biases. There is much more to learn directly from IPLCs, urging for the need to work with these groups (including indigenous and local knowledge holders, scholars, etc.) to fill in gaps in both the literature and in policy practice. This is not only because they hold the key to this vital knowledge, but, equally relevant, because of their sovereignty over their knowledge. Finally, it is worth mentioning that, although differences between knowledge systems do exist, including issues of intellectual property rights, linguistic particularities, context-based knowledge and others, some academic sources emphasize an existing polarization between ILK and western science or academic knowledge, which does not necessarily reflect what happens in practice. For example, some values of nature found to be connected to IPLCs' worldviews are also shared by several other sociocultural groups in both rural and urban contexts (see 2.2.1 for examples). This calls for a need to recognize the synergies and intersections across knowledge systems that can help to build dialogue, understandings and collaborative initiatives in valuation processes and policies for biodiversity conservation and sustainability (Taylor *et al.*, 2020; McElewee *et al.*, 2020).

1.5 THE ROADMAP OF THE VALUES ASSESSMENT

The *values assessment* is organised into six chapters that address different aspects of the roles of the diverse values of nature in decisions and policies **(Figure 1.11)**. Chapter 1 provides an introduction to the assessment report. Chapter 2 sheds light on the multiple conceptualisations of the values of nature, given that they emerge from the different ways people understand, interpret and experience human-nature relationships, expressed in diverse worldviews, languages and knowledge systems. Chapter 3 analyses the goals, principles, capacities and current applications of valuation methods and approaches, and provides an overview of the potential and limitations of existing valuation methods to inform decision-making. Chapter 4 focuses on the values revealed by existing institutions, whether (or not) the outputs of valuation methods are taken up in decision-making, and how the expression of values along with other factors including power and knowledge, influence decision outcomes. Chapter 5 explores the types of values that are associated with different futures, and the mechanisms and approaches that facilitate transformative change and shifts towards more sustainable and just pathways. Lastly, Chapter 6 examines the operationalisation and capacities needed to successfully incorporate the diverse values of nature into decision-making in a way that enables transformative change.

The *values assessment* offers a toolkit for decision-makers to navigate the complexities associated with the existence of a large diversity of values of nature and the different roles played by these values in decisions **(Figure 1.11)**. These include the key concepts, typologies, guidelines and policy support tools that guide a constructive engagement with the diverse values of nature at different decision-making stages. These tools allow a wide range of stakeholders to pave the way for the transformations needed to address the current biodiversity crisis and achieve more sustainable and just futures as envisioned by the SDGs.



KEY QUESTIONS ADDRESSED BY EACH CHAPTER		
VALUES	CH.2	• How can nature's diverse values be conceptualized and categorized? • What frameworks help organize and communicate nature's value? • What factors affect value expressions in individual behaviour and collective decisions? • How can policymaking engage value formation and change as a dynamic process?
VALUATION	CH.3	• What different valuation methods and approaches can be used to elicit nature's values? • Where, when, how and why are valuation methods used? • What are the main characteristics of the different valuation methods? • How can valuation methods complement each other? • How is valuation undertaken by indigenous peoples and local communities? • What key considerations guide valuation? • How can valuation practice be improved?
DECISIONS	CH.4	• What is the role of values and valuation in decision-making to support the Sustainable Development Goals? • What is the role of values and power relations in public institutions? • How are values articulated through institutions by indigenous peoples and local communities? • What are the social and ecological outcomes of the way values are articulated in decision-making? • How can valuation be uptaken up to support decision-making?
FUTURES	CH.5	• What values and whose values are considered in futures works? • Which combinations of values do Futures works find to be aligned with just and sustainable futures? • What role can diverse values and valuation of nature play in promoting transformation towards sustainability? • What kinds of actions can mobilize diverse values for transformative change? • How do knowledge and values combined shape alternative pathways towards just and sustainable futures?
OPERATIONALIZATION	CH.6	• How far can existing policy options leverage diverse values of nature for transformative change? • What policy options exist within and across sectors to engage with nature's diverse values for transformative change? • What are the main gaps and the role of capacity development for operationalizing the diverse values of nature? • What are the key principles that can guide the operationalization of nature's values in decision-making?

Figure 1 11 **The main questions addressed, and methodological tools provided by each of the chapters.**

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Chapter 2

CONCEPTUALIZING THE DIVERSE VALUES OF NATURE AND THEIR CONTRIBUTIONS TO PEOPLE[1,2]

COORDINATING LEAD AUTHORS:
Christopher B. Anderson (Argentina, United States of America/Argentina), Simone Athayde (Brazil/United States of America), Christopher M. Raymond (Australia, Netherlands/Sweden, Finland), Arild Vatn (Norway)

LEAD AUTHORS:
Paola Arias-Arévalo (Colombia), Rachelle K. Gould (United States of America), Jasper Kenter (Netherlands/United Kingdom of Great Britain and Northern Ireland), Barbara Muraca (Italy/United States of America), Sonya Sachdeva (United States of America), Aibek Samakov (Kyrgyzstan), Egleé Zent (Bolivarian Republic of Venezuela)

FELLOWS:
Dominic Lenzi (Australia, Italy/Germany), Ranjini Murali (India), Ariane Amin (Côte d'Ivoire)

CONTRIBUTING AUTHORS:

Hasiyatu Abubakari (Ghana), Dana Baker (United States of America), Sebastián Ballestas (Colombia), Thomas Beery (United States of America), Jordan Blanchard-Lafayette (United Kingdom of Great Britain and Northern Ireland), Robert Blasiak (United States of America), Adams Bodomo (Ghana), Marcus Briggs-Cloud (United States of America), Harry Cross (United Kingdom of Great Britain and Northern Ireland), Bruna Franchetto (Brazil, Italy), Lina Gutierrez-Cala (Colombia), Zuzana Harmáčkova (Czech Republic), Adam P. Hejnowicz (United Kingdom of Great Britain and Northern Ireland), Austin Himes (United States of America), Dylan Inglis (United Kingdom of Great Britain and Northern Ireland), Hiroe Ishihara (Japan), Samuel Issah (Ghana), Chris Ives (Australia), Jeremiah Julius (United States of America), Roope Kaaronen (Finland), Heeseo Kwon (Republic of Korea), Alexandra Lavrillier (France), Kinga Magdolna Mandel (Hungary), Javier Mejía Cruz (Colombia), Thais Moreno (Brazil), Gabriel Nemogá (Colombia), Sebastian O'Connor (United Kingdom of Great Britain and Northern Ireland), Henrik Österblom (Sweden), Nicol Dayan Pacheco Valdes (Colombia), Valentina Perdomo Nuñez (Colombia), Lauren Prox (United States of America), Sue Ranger (United Kingdom of Great Britain and Northern Ireland), James Reeves (United Kingdom of Great Britain and Northern Ireland), Annalee Ring (United States of America), Julian Rode (Germany), Ana Carolina Rodríguez Alzza (Peru), Kurt Russo (United States of America), Margrét Rós Sigurjónsdóttir (Iceland), Jane Simpson (Australia), Sanna Stålhammar (Sweden), Andrés Suárez (Colombia), Bron Taylor (United States of America), Leah Temper (Canada), Maria Tengö (Sweden), Henrik Thoren (Sweden), Araceli Torres Morales (Mexico), Catalina Trujillo (Colombia), Hein Van der Voort (Netherlands), Julian Zúñiga-Barragán (Colombia)

REVIEW EDITOR:
Kai Chan (Canada)

TECHNICAL SUPPORT UNIT:
Mariana Cantú-Fernández

1. This is the final text version of Chapter 2.
2. Authors are listed with, in parentheses, their country or countries of citizenship, separated by a comma when they have more than one; and, following a slash, their country of affiliation, if different from that or those of their citizenship, or their organization if they belong to an international organization. The countries and organizations having nominated the experts are listed on the IPBES website (except for contributing authors who were not nominated).

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The designations employed and the presentation of material on the maps used in the assessment do not imply the expression of any opinion whatsoever on the part of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. These maps have been prepared or used for the sole purpose of facilitating the assessment of the broad biogeographical areas represented therein.

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Chapter **2**

CONCEPTUALIZING THE DIVERSE VALUES OF NATURE AND THEIR CONTRIBUTIONS TO PEOPLE

EXECUTIVE SUMMARY

Humanity confronts multiple socio-environmental crises that are also a values crisis (e.g., biodiversity loss, climate change, emergent diseases) {2.1.1; 2.1.2}. There is consensus that environmental decision-making can be enhanced by being more inclusive of nature's diverse values {2.1.1}. Yet, understanding nature's values requires grasping different conceptualizations of the ways people interpret and experience human-nature relationships, such as worldviews informed by different knowledge systems, cultures, languages and disciplines. Better engagement of this diversity offers opportunities to make policies more rigorous, effective and inclusive {2.1.2}.

Chapter 2 aims to help decision-makers characterize and assess different conceptualizations of the diverse values of nature and how they are expressed, formed and changed **(Figure 2.1)**. It uses scoping, systematic and critical reviews, complemented with regionally- and thematically balanced case studies to assess academic literature, government policies and indigenous and local knowledge (ILK). Findings provide conceptual background for subsequent chapters and insights for decision-makers to engage, manage and incorporate the conceptual diversity of values in governance frameworks that have impact on nature and its contributions to people **(Figure 2.2)**.

Key messages highlight (i) concepts that help diagnose policy-relevant challenges and opportunities and (ii) guidance to use these concepts in solutions to achieve better conceptual, practical and ethical outcomes {2.1}.

1 **Predominant environmental governance frameworks have privileged instrumental values (e.g., economic growth through markets) and contributed to the present biodiversity, climate and health crises. Frameworks that enable the expression of other value types can support sustainability outcomes (e.g., inclusive wealth accounting, participatory management), but careful attention should be paid to the complexity of factors that relate values with individual and collective behaviour *(well established)*.** Diverse values of nature exist; their incorporation into decision-making can contribute to well-being, sustainability, and justice outcomes. Ample evidence demonstrates that economic growth, as currently conceived and measured, contributes to the deterioration of nature and nature´s contributions to people {Box 2.7}. However, few international biodiversity and sustainability policies explicitly recognize that economic growth can be problematic for biodiversity {2.1}. Almost conversely, many conservation strategies have prioritized non-human nature, regardless of societal impacts. More nuanced and inclusive framings of human-nature relationships can overcome these divergent understandings {2.2.1}. For example, sustainability-aligned values (i.e., broad values like care, equity, reciprocity and justice) coincide with multiple visions of supporting the planet's long-term ecological integrity together with more sustainable social outcomes {2.2.1; 2.2.3.1; 2.3.2; 2.4.2}. While certain values support these goals more than others, multiple factors intervene when translating values into behaviours, including demographic characteristics, feelings of self-efficacy and the physical capacity to engage. Values embedded within social and institutional structures and biophysical contexts can promote or constrain different behaviours {2.4; 2.5.1; 2.5.2}. To ensure governing frameworks are able to achieve desired outcomes for people and nature, policymakers could consider the various types of values at stake (and for whom), which valuation methods are most appropriate for the context, the power dynamics involved, and the institutional adjustments needed for effective policy implementation {2.4.1.4; 2.4.2; **Box 2.9**}.

2 **Value expression and prioritization are influenced by the governance frameworks in place, including who has the power to make decisions. Strengthening participatory processes and designing appropriate frameworks can facilitate better consideration of multiple perspectives on instrumental, intrinsic and relational values *(well established)*.** Power influences value expression through: (i) societal structures and institutions, including the authority to determine laws and other rules and having rights to use natural assets and nature´s contributions to people; and (ii) discourses that emphasize some worldviews and values over others, including the framing of decision-making

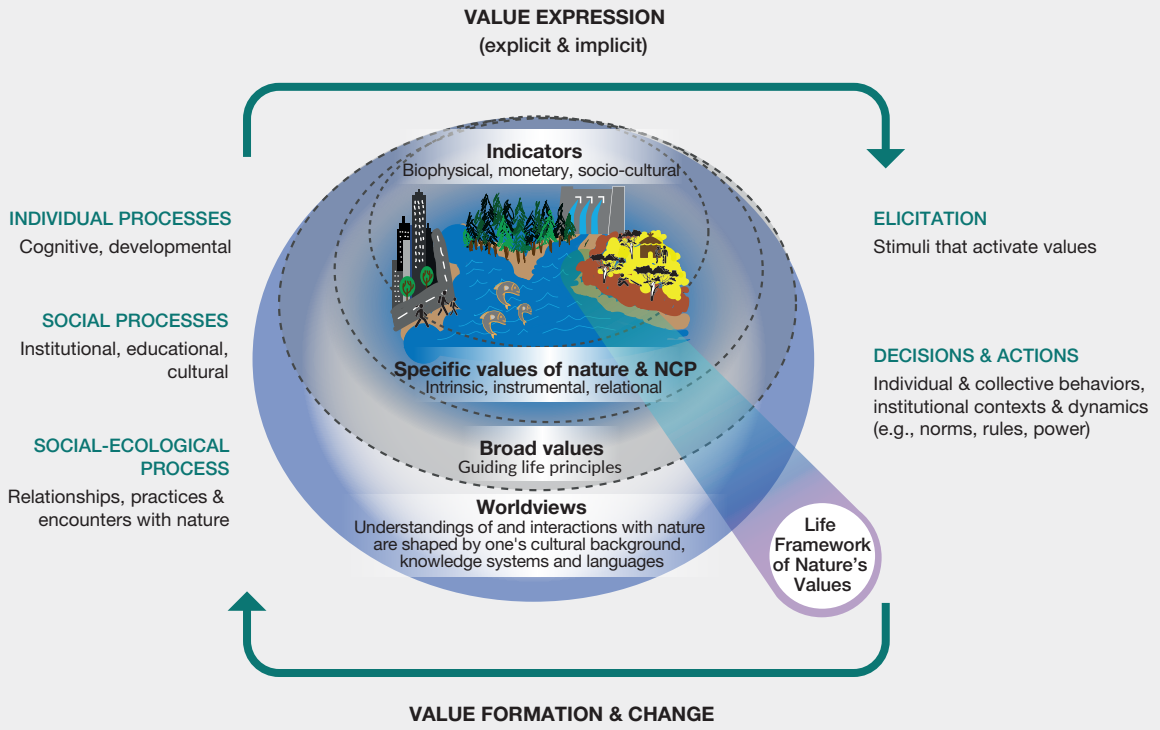

Figure 2 1 **Value concepts addressed in Chapter 2.**

'Value' has different meanings across academic, policy and cultural contexts. Clarifying these perspectives allows better recognition, communication and incorporation of diverse values and stakeholder interests into decision-making {2.1}. Core concepts in the chapter's values typology include worldviews {2.2.1}, language-value connections {2.2.2}, broad values {2.2.3}, specific values (i.e., instrumental, intrinsic, and relational values) {2.2.3} and various biophysical, monetary and socio-cultural value indicators {2.2.4}. To help organize this diversity, four life frames illustrate how particular human-nature relationships prioritize certain sets of values {2.3}. Furthermore, values are embedded in norms and rules that influence individual and collective expressions, decisions and actions {2.4}. They form and change through individual and social processes as well as socio-ecological interactions and experiences {2.5}. Finally, these concepts inform broader IPBES efforts, including this assessment, and future capacity-building that addresses knowledge and operational gaps to promote just and sustainable futures {2.6}.

processes {2.4.1.4; Annex 2.1}. Hence, governance frameworks (i.e., the institutions framing economic, political decision-making and socio-cultural processes) emphasize different values and have varying capacities to express and protect nature's diverse values **(Figure 2.2)** {2.4.2.3}. Economic decision-making is largely oriented towards producing goods and services to trade in markets, emphasizing certain instrumental values. Political decision-making, including economic and development policies, has focused largely on facilitating market expansion, combined with some conservation policies protecting intrinsic values. Socio-cultural decision-making (e.g., forming individual or collective identities) places more emphasis on relational and intrinsic values, when prioritizing values like sense of place and relationships with more than-human species {2.4.2.3}. Political decision-making, with its power to define societal rights and responsibilities, is positioned to establish frameworks that can more fully incorporate the diversity of nature's values across decision-making contexts. Such political decisions may concern the specification of property rights (common, private or state), the role of markets and the types of markets that are supported (e.g., global vs. local). They also concern what types of environmental regulations and incentives are favoured. These frameworks can help activate, support or hinder the expression of values and norms that are important to different social groups {2.4.1; 2.4.2}.

3 **Predominant economic policies align with a "grow first, correct afterwards" approach to nature's values. In a world characterized by tipping points, this strategy often erodes the values of nature and can be costly and difficult to reverse. When developing economic policies, a more holistic, long-term focus on environmental and social impacts could help to achieve transformations towards environmental sustainability and social justice *(well established)*.** General economic policies have been focused on growth (e.g., deregulating trade). Conceptually, this has been justified by equating well-being with monetary wealth. The negative socio-environmental impacts have often been

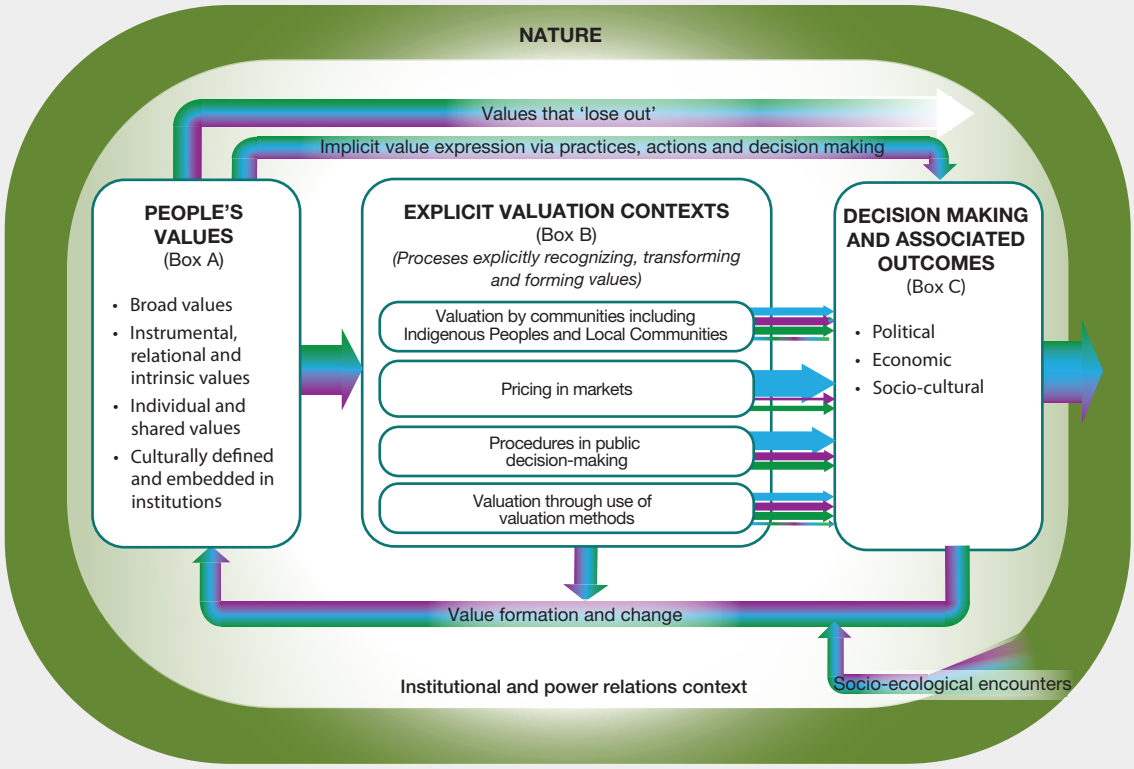

Figure 2 2 **Explicit and implicit value expression and decision-making. Blue = instrumental values; Purple = relational values; Green = intrinsic values; Blended colours = integration between values.**

addressed only after they have appeared. At that stage, it is very costly to change policy direction, given existing investments and institutional structures with their embedded interests and power relations {2.4.2.3}. Tipping points add to the challenges of maintaining the values of nature; when mitigation is attempted, it may be too late or insufficient, as evidenced by the ongoing climate and biodiversity crises {2.4.2.3}. Economic policies that prioritize living from nature do attain some instrumental values (e.g., consumption of nature's material contributions to people by more economically and politically powerful social groups), but concomitantly have at least three negative implications: (i) relational and intrinsic values are put at risk, (ii) the distribution of these same instrumental values to vulnerable social groups may be compromised, and (iii) the long-term flow of instrumental values is jeopardized {2.3.2; 2.4.2}. Sustainability is questionable in an economic system based mainly on a short-term, narrow instrumental value-logic. Supporting the expression of sustainability-aligned values makes it possible to consider the local and global linkages of both social and ecological outcomes more adequately, emphasizing reduced environmental impacts, ensuring equitable wealth distribution, providing prosperity and supporting ethical management practices {**Box 2.4**; 2.2.3.1; 2.4.2.3}.

4 **Diverse values of nature arise from diverse worldviews, cultures, knowledge systems and languages that have developed from people's long-term, place-based relationships with nature. Philosophies of good living found throughout the world offer pathways to achieving collective human-nature well-being, linking diverse values with practices, policies and institutions *(well established)*.** Worldviews are metaphorical lenses through which individuals and social groups perceive, think about, interpret, inhabit and modify the world. They are informed by one's cultural context and background, knowledge system and language {2.2.1; 2.2.2}. Many ILK-based worldviews recognize the world as a relational sphere, where other-than-human entities like rivers or biotic communities are subjects with rights and duties. This relational and reciprocal perspective forms the basis for collective human-nature well-being, including concepts like *Buen vivir* in South America and *Ubuntu* in sub-Saharan Africa, among other philosophical traditions, which have inspired scholarly work, policies and social movements from local to global scales. Although the academic literature reflects a polarization between those values held by indigenous peoples and local communities, Eastern and Western knowledges and/or

society, there may be considerable overlap between some of these groups' broad and specific values tied to Philosophies of good living and collective human-nature well-being, which could be recognized and explored in more depth in research and policy {2.2.1}. Emerging social norms, collectives and movements around current issues such as mindfulness, urban nature conservation, and climate change mitigation and adaptation, may nurture and share relational values of reciprocity, care, responsibility and interconnectedness with nature (among others) within and across various societal groups {2.2.1; 2.5.2}. Convergences or synergies of worldviews and values across different groups can be catalysed through decision and policy-making, and operationalized through existing or new institutions to promote biodiversity conservation, sustainability-aligned values and/or pro-environmental behaviour {2.2.1; 2.2.3; 2.3.1; 2.5.2; **Box 2.2**}.

5 While 'value' generally refers to what is good or important, the term is applied in different ways in particular academic, policy and social contexts. Therefore, it can be useful to clarify the dimension and type of value being considered to establish a common understanding across contexts *(well established)*. The values of nature and human-nature relationships pertain to both broad values and specific values. Broad values express life goals or guiding principles (e.g., sustainability, justice, prosperity), as informed by the general beliefs emanating from worldviews {2.2.3.1}. Those broad values associated with or supporting the achievement of the Sustainable Development Goals (SDGs) and sustainability processes can be called sustainability-aligned values {2.2.3.1, 2.3.2, 2.4.2}. Sustainability-aligned broad values concerning human-human relationships (e.g., equity, unity, reciprocity, justice) are key to pathways of transformation towards more sustainable futures (see also Chapter 5). They can foster, for example, a shift from solely individualism, materialism and economic profit to other principles like care, unity, equity, reciprocity and justice {2.3.2.3}. Specific values refer to how people express the importance of particular elements of or relationships with nature in given situations and contexts {2.2.3.2}. Specific values can be categorised according to instrumental, intrinsic and relational reasons why nature, nature´s contributions to people and human-nature relationships matter to people. While all value typologies have limits, making the meaning of value explicit (e.g., broad values, specific values or value indicators), recognising diverse values and using multiple indicators are all important, particularly in complex and contested decision-making contexts {2.2.3.3; 2.2.4}.

6 Instrumental, intrinsic and relational values are specific ways of expressing why nature, nature´s contributions to people and human-nature relationships are important to people. These categories provide opportunities for more conceptually rigorous, practically effective, and ethically-based valuation policies and practices that balance different sectoral needs and stakeholder interests *(well established)*. Academic and policy sources have extensively debated instrumental (i.e., things or processes important as means to some human end) and intrinsic values (i.e., values of nature expressed regardless of reference to humans). Relational values have become an increasing part of discourse and practice to express the value of desirable, meaningful and reciprocal human relationships with nature and among people through nature {2.2.3.2}. Relational values help express the role of contextual bonds to places or practices. Recognizing instrumental, intrinsic *and* relational values as distinct ways people conceive the importance of nature and nature´s contributions to people also helps identify the scope, appropriateness and use of particular value indicators (e.g., biophysical, monetary and socio-cultural) and value elicitation methods. Considering different value expressions can help understand why perspectives on nature and nature´s contributions to people are divergent (i.e., sources of conflict, disagreement) or convergent (i.e., sources of collaboration, legitimation, alliances). In decision-making, specific values can be used to (i) make visible otherwise neglected, intangible costs and benefits, thereby facilitating more inclusive and just expression of values; (ii) clarify, reduce or avoid conflicts by fostering participation among stakeholders; (iii) enable a more comprehensive and representative evaluation of why people value nature differently, nature´s contributions to people and human-nature relationships; and (iv) build common ground across different stake- and right-holders in support of biodiversity conservation and sustainable development {2.2.3.3}.

7 The diverse values of nature and the different ways of relating to nature can be effectively organized and communicated through 'life frames' of nature's values, such as living from nature, living with nature, living in nature and living as nature (Table 2.1). The living from nature frame has been privileged in environmental research and policy, driving unsustainable outcomes *(well established)*. A more balanced representation provides multiple levers for sustainability transformations, including different sets of sustainability-aligned values *(established but incomplete)*. A systematic review illustrated that these four ways of framing values effectively encompasses diverse human-nature relationships. Living from nature emphasizes that nature matters for its uses, goods and services to support human life, needs and prosperity. Living with nature considers nature for its cycles, life supporting processes, and many other species, with a right to flourish regardless of their contribution to human well-being. Living in nature illustrates that nature matters as place and land, contributing to history, culture and meaning.

Living as nature emphasizes that nature matters because it constitutes people physically, mentally and spiritually, experienced through relations of oneness, kinship and interdependence {2.3.2}. These frames are not mutually exclusive; people and institutions can express and embed multiple frames. Over- or under-emphasizing a life frame can lead to unsustainable outcomes; for example, over-emphasizing living from nature can become living against nature, as evidenced by the over-consumption of nature's material contributions to people and the destruction of biodiversity {2.3.2.2}. Each life frame emphasizes different aspects of sustainability and justice, and as such can also leverage different sustainability-aligned values {2.3.2}. Shifting policy emphasis from living from nature to the broader set of frames provide multiple levers for sustainability by more comprehensively establishing relations between nature and good quality of life through a more inclusive set of policy tools and value indicators **(Table 2.1)** {2.3.2}.

8 Shared and social values, beyond the individual, are expressed in different ways, which has implications for how to engage diverse groups in decision-making about nature and its contributions to people *(well established)*. Values are represented and enacted in society at different scales beyond the individual, including groups, communities, societies and cultures. Social values can in part be

Table 2 1 **Life frames of nature's values.**

Chapter 2 applied four life frames to understand how certain broad and specific values are highlighted in particular decisions related to policy outcomes.

Life frames of nature's values	Living AS nature	Living IN nature	Living WITH nature	Living FROM nature
Examples of broad values relevant to policy framings	Oneness and harmony with nature, reciprocity, self-realisation, epistemic justice	Belonging, beauty, freedom, enjoyment, health, procedural justice for place-based management	Stewardship, responsibility, respect, recognition justice with regard to other species	Prosperity, livelihood security, efficiency, distributive justice for sustainable use
Emphasised specific values for nature & nature's contributions to people	*Relational & intrinsic* values for communities of humans & non-humans	*Relational* values of non-material & context-specific nature's contributions to people	*Intrinsic* values, *relational* values associated with stewardship, *instrumental* values of regulating nature's contributions to people	*Instrumental* use & option values of material & regulating nature's contributions to people, *relational* values of non-material nature's contributions to people in agriculture & fisheries
Example indicators to assess progress	• Participation in practices of care *(sociocultural)* • Conservation status of natural entities considered to harbour agency *(biophysical)* • Connectedness to nature scales *(sociocultural)* • Ethnographic references *(sociocultural)* • Recognition of legal personhood for nature *(sociocultural)*	• Landscape character assessments *(sociocultural)* • References in historical document analysis *(sociocultural)* • Tourism revenue *(economic)*	• Alpha, beta & gamma biodiversity *(biophysical)* • Legal rights of natural entities *(sociocultural)* • Planetary pressures adjusted human development index *(integrated)* • Extent of community conservation plans *(integrated)*	• Stock indicators *(biophysical)* • Environmental economic accounts *(economic)* • Inclusive wealth *(economic)* • Circular economy indicators *(economic)* • Gini correlations with natural resources *(economic)* • Recognition & distribution of indigenous and local land rights *(sociocultural)*
Example of policy measures	• Establish active targets & measures to address 'nature deficit' for urban populations and children (e.g., forest schools). • Design policies to protect languages & biodiversity in an integrated manner. • Support customary governance practices that ensure integrity of IPLCs & ILK.	• Link natural & cultural heritage through place-based management. • Design blue & green infrastructure to recognise needs of diverse groups through effective participatory processes. • Integrate green prescribing in health systems.	• Establish new protected areas in accordance with IUCN categories in partnership with diverse knowledge holders. • Build legal frameworks to establish & respect rights of nature. • Consistently assess impact on biodiversity & nature's contributions to people in tandem with economic impacts.	• Implement standards for national & corporate environmental accounting. • Implement alternatives to GDP more inclusive of natural capital. • Review resource access & rights distributions to take account of distributive justice concerns.

established by aggregating (i.e., summing up) individual values, but this is a conceptually and ethically challenging task that can lead to social inequities, especially when values of minority groups are masked or future generations are heavily discounted {2.4.1; **Box 2.9**}. Shared values are the broad and specific values that people express collectively, in groups, communities, and across society as a whole. They can be formed through long-term processes of value formation and socialisation and shorter-term processes, such as group deliberations {2.5.1}. They do not relate to a process of aggregation, but rather to a process of co-learning and bridging values. In deliberation, participants can act as citizens rather than consumers, frequently drawing on values towards the common good. This is important because there is often a mismatch between consumer preferences and sustainability-aligned values. Shared and individually aggregated social values do not necessarily diverge and can be used in tandem. However, shared values approaches can be more robust and considered more legitimate when policymakers are faced with substantial uncertainty, many constituencies and potential for conflict {2.2.4; **Box 2.9**}.

9 **When developing policies, decision-makers encounter stakeholders who conceive the diverse values of nature differently. Clarifying the similarities and differences between these conceptualizations can allow better engagement of different policy domains across sectors, academic traditions and social groups or cultures *(well established)*.** In the academic literature, most publications about the values of nature are on biophysical topics published in life and physical science journals. Socio-cultural topics are the second most numerous, while economics and themes related to indigenous and local knowledge are the fastest growing {2.1.2}. The most frequently referenced academic concept for understanding human-nature relationships was ecosystem services (40.5% of reviewed articles) {2.3.1}. Navigating between different worldviews is critical for engaging diverse knowledge systems, disciplines and social groups in environmental decision-making and for better understanding how conceptualisations of value differ across knowledges and languages {2.2.1; 2.2.2}. People express values through oral and written articulation, and also via praxis, including embodied corporeal and spiritual experiences {2.3.2}. Understandings and expressions of value vary within and across disciplines and between individuals and socio-cultural groups. Anthropocentric worldviews shape individual and collective behaviours to attend to human needs {2.2.1}. This contrasts with relational worldviews that emphasize how groups form shared values connected to nature and integrate them into institutions, such as norms and legal rules {2.2.1}. Bio- and ecocentric worldviews are also reflected in national biodiversity strategies & action plans (NBSAPs) {2.1.1}, highlighting nature's intrinsic values {2.2.1}. Interdisciplinary and intercultural dialogues involving multiple stakeholders and perspectives can enhance opportunities for nature's diverse values to be recognized and addressed in more legitimate and inclusive policymaking processes {2.2.2}.

10 **Conceiving the values of nature and its contributions to people in economic terms (e.g., via economic valuation, market value indicators, economic incentives) plays a predominant role in many individual, corporate and governmental decisions. These approaches effectively highlight the dependence of economies on nature, but are inadequately representing multiple value perspectives, especially intrinsic and relational values. Including a diversity of economic approaches and employing multiple indicators can help strengthen nature's diverse values in policymaking *(well established)*.** Conventional economics largely understands 'value' in terms of individual preferences expressed through actual or hypothetical market transactions {2.2.4}. This approach has made significant contributions to account for many values of nature that are not considered in actual market transactions, thereby facilitating their incorporation into policymaking. For example, focusing on the economic value of ecosystem services (e.g., total economic value framework) highlights the dependence of economic development and human well-being on ecosystems and helps decision-makers recognize a wide range of instrumental values {2.2.4}. At the macro-economic level, indicators like inclusive wealth can reflect the importance of ecosystem services for prosperity. While guiding policy and decisions in many situations, these approaches also have important limitations. They do not effectively represent intrinsic and relational values, which are more difficult to express in terms of monetary indicators. Moreover, instrumental values for vulnerable groups tend to be underrepresented in policymaking. Addressing such limitations can support more inclusive decisions based on different value indicators and more plural forms of valuation and decision-making. For example, policies can broaden the set of approaches employed to understand well-being, including ecological economics, feminist economics and ILK philosophies of good living {2.2.4; 2.4.2}, and use indicators reflecting more plural perspectives on well-being and its dimensions, such as the UNDP human development dashboard, the genuine progress indicator, or the sustainability dashboard {2.2.4; **Box 2.7**}.

11 **Many environmental policies seek to create or modify values of nature to affect behavioural change. Effective policies aiming to influence values can benefit from understanding value formation and change as interrelated individual, social and socio-ecological processes *(well established)*.** Frequently, policies like national biodiversity strategies and action plans attempt to directly link values

and behaviour by raising awareness of biodiversity or promoting pro-environmental attitudes {2.1.2; Annex 2.2}, but these are multi-faceted processes {2.4.1; 2.5.1}. For example, once formed, broad values are considered relatively stable, but are more malleable at certain development stages in an individual's life cycle (e.g., early childhood, early adulthood) or potentially due to major socio-ecological shifts (e.g., significant life events, political changes, natural disasters, pandemics). Consequently, significant changes to broad values in a society often occur at inter-generational time scales. By definition, though, specific values respond to particular contexts. Therefore, social structures and dynamics like markets, monetary incentives, social norms, cultural rituals and gender roles are important in forming and changing specific values. In turn, social and socio-ecological factors can be institutionalized and create feedback between value expression and formation {2.4.2.1; 2.4.2.2; 2.5.2}. For example, religions are practiced by most of the world's population, and as institutions their informal norms and formal structures shape, form and change worldviews and associated values {2.5.1; Annex 2.3}. Further, contextual factors like age-based roles and cultural practices not only express specific values, but they also modify them as a result of social dynamics and socio-ecological relationships between humans and nature (e.g., environmental education, arts, direct encounters) {2.4.1; 2.5.1}. In policymaking, it is relevant to distinguish change in values of individuals or social groups from change in their value expression via alterations in prioritizations. These changes also need to be considered in the context of shared and social values **(Box 2.9)**. In some cases, it may be more effective and ethical for policies that aim for pro-environmental outcomes to activate or enable existing sustainability-aligned values {2.4.1; 2.5.2}.

12 Biodiversity, languages, human-nature relationships and values are interconnected and have been simultaneously eroded. Policies can seek to form or maintain values at risk. Combatting biodiversity loss and nature degradation is connected to preserving knowledge about nature (i.e., ecoliteracy) and the languages that transmit such knowledge both among IPLCs and in broader society *(established but incomplete)*. Languages express biocultural diversity (i.e., the interconnections between biological, cultural and linguistic diversity), human identities and values. Languages capture, maintain, transmit and convey knowledge, values and practices that support biodiversity and nature´s contributions to people connected to specific places, ecosystems and territories. Biodiversity and human languages face critical and interlinked crises: around 40% of the world's estimated 7151 languages are already extinct or endangered, and about half of the languages currently spoken will likely disappear by the end of this century {2.2.2}. Language loss has led to an erosion of indigenous and local knowledge, ecoliteracy, and associated values of nature across diverse socio-cultural groups in both rural and urban settings. Policies seeking to value nature or conserve biodiversity could be reinforced by better integration with knowledge, culture and language-oriented research and policies, including intercultural and multilingual language education and revitalization. Doing so would enhance strategies for sustainable living by being more inclusive of diverse conceptualizations of nature's values {2.2.2; 2.2.3}. This would also enhance policy efficacy to conserve biocultural diversity, which includes both biodiversity and the different place-based languages, practices and values connected to it {2.2.2; 2.2.3; **Box 2.3**}.

13 Values can be expressed explicitly and implicitly. In addition to the influence of worldviews, languages, knowledge systems and power relations, value expressions are affected by the decision-making context. Critical factors to consider include institutions, individual capacities and biophysical conditions *(well established)*. Explicit value expressions are those where it is possible to identify what is considered to be important. They may include oral (e.g., deliberation) as well as written expressions (e.g., stated preference surveys), values as expressed in market purchases, and community decisions. On the other hand, implicit value expressions are tacit and embodied in everyday practices (e.g., habits) and rituals {2.4.2}. Both forms of value expression are mediated by institutions (i.e., norms, customs, legal rules) that promote certain values and obscure others, which in turn influences actions and outcomes **(Figure 2.2)**. Understanding the relationship between institutions and values can help identify leverage points for changing values expressed in decision outcomes. For example, environmental policies and incentives can be designed to fit local institutions, promoting greater social acceptance and compliance {2.4.1.3}. Beyond institutions and biophysical conditions, actions and behaviour are influenced by individual factors, such as demographics, income and physical and cognitive capacities {2.4.1.2}. The coexistence of these individual, social and biophysical aspects influencing action can create a gap between expressed values and observed actions {2.4.1.2}. Therefore, strategies oriented to protect nature's diverse values can be improved if the relationships and conflicts between these elements are identified and addressed {2.4.1}.

14 Valuation methods are based on different rules regarding who should participate in the valuation process, and in what form values can be expressed and conclusions drawn by valuators. Hence, the type of method used influences which values are emphasized in valuation processes, how they are interpreted, communicated and ultimately influence policy outcomes. Decision-makers may enhance the quality and relevance of valuation studies by systematically identifying the method(s)

that are the best fit to the issue at hand *(well established)*. Valuation methods and approaches (e.g., deliberative methods, economic valuation, environmental impact assessments and multi-criteria analyses) facilitate value visibility and expression. By defining whose values are considered, how values can be expressed and what knowledge and value aspects become emphasized, methods strongly influence the values elicited and the ensuing policy recommendations {2.4.2.2}. Being more aware of these implications will increase the quality and relevance of valuation outcomes. In such assessments, it is important to consider the type of values at stake and their framing, how the involved stakeholders can best express these values, how value conflicts should be treated, and how to recognize the power dynamics involved {2.4.2; **Box 2.9**}.

15 Addressing the knowledge gaps (e.g., research, data) and operational gaps (e.g., information, resources, capacities) identified by this chapter can help make decision-making more rigorous, effective and ethical *(established but incomplete)*. Further study of the diverse ways nature's values are understood can help bring to light new perspectives (e.g., **Box 2.5**), and highlight how values are affected by social and power structures (e.g., gender roles, IPLC) {2.2.1; 2.4.2.2; 2.5.1}. First, new research is particularly important to take into account ways of knowing and valuing that are not necessarily expressed in international academic databases {2.1.2; 2.2.1} to reflect the interests of the world's historically disadvantaged peoples {2.4.2}. This also includes coordinating efforts to link linguistic studies and language revitalization efforts into biodiversity studies and management plans, as well as into valuation initiatives and decisions across scales {2.2.2}. Second, policies need more information to predict how values will respond to socio-ecological shifts (e.g., natural disasters, climate change, biodiversity loss) {2.5.2}. Third, bridging or balancing multiple life frames and forming shared values require new resources and capacities to be able to identify and manage diverse conceptualizations of nature, such as the ability to navigate between disciplines, worldviews, cultures, knowledge systems and languages {2.2.1; 2.2.2; 2.3.2}. In particular, there are opportunities to broaden and diversify the policy application of different values of nature. Specifically, the relational value concept has been little operationalized in policy {2.1.2; 2.3.1}. Finally, there is an operational need to identify institutional constraints and catalysts for integrating diverse understandings of nature (and their associated social groups) into decision-making processes via transformative policies (e.g., pandemic preparedness, decarbonizing and "greening" economies, corporate governance, socio-environmental justice, and the use of plural indicators of sustainable economic and societal goals, among others) {2.4.2; 2.5}.

2.1 INTRODUCTION

2.1.1 Scope of the chapter

There is consensus among IPBES member-states that environmental and development decisions are not achieving their intended values-related outcomes (IPBES/6/INF/9). This 'values crisis' relates directly to humanity's multiple socio-environmental crises, including the loss of biological and cultural diversity, the risks associated with climate change, the emergence of pandemic diseases and obstacles for achieving equitable, just and sustainable lifestyles (IPBES, 2019c; MEA, 2005; Pörtner *et al.*, 2021; United Nations, 2015; Zafra-Calvo *et al.*, 2020). In this context, 'values' include life goals, beliefs and general guiding principles. Values also can reflect judgements or measurements of the importance of specific things in particular situations and contexts. When considering the values of nature, one can refer to nature itself, nature's contributions to people or the ways people express the value of life-supporting processes, functions and systems –interrelating biophysical, spiritual or symbolic aspects. Chapter 2 focuses on these diverse conceptualizations of nature's values, given that they emerge from the different ways people understand, interpret and experience human-nature relationships.

Despite nature's diverse values, predominant environmental and development paradigms have prioritized a subset of ecological measures (e.g., genetic diversity, endemic species richness) and economic growth indicators (e.g., Gross Domestic Product) (Dasgupta, 2021; Menton *et al.*, 2020; Otero *et al.*, 2020). Global reviews demonstrate that international biodiversity policies and databases lack a 'diversity of values' approach (Zisenis, 2009); most databases developed specifically to implement ecosystem services policies focus on economic indicators (Schmidt & Seppelt, 2018). Similarly, a review conducted for this chapter of national biodiversity strategies & action plans (NBSAPs)[3] found that in both the Global North and South, national biodiversity strategies & action plans apply the Convention for Biological Diversity's (CBD) expansive understanding of nature's values in overall objectives, but continue to emphasize anthropocentric framings and biophysical and economic indicators in their implementation activities (see Annex 2.2). Indeed, national biodiversity strategies & action plans are mostly about vision and planning, and none of those reviewed explicitly detailed how to treat diverse values in policy tools. Nonetheless, there are examples of socio-cultural indicators (e.g., environmental awareness) and indigenous and local knowledge integration (e.g., inclusion of historically disadvantaged stakeholders) in these documents, as well as recognition of intrinsic values and ecocentric worldviews.

3. Analysis of national and international policy documents related to biodiversity and sustainability (https://doi.org/10.5281/zenodo.4399907).

This chapter aims to support improvements in decisions and policymaking by **characterizing and assessing different conceptualisations of the diverse values of nature, including human-nature relationships, from different academic and socio-cultural traditions and perspectives** (IPBES/6/INF/9). The chapter is guided by five questions that structure its sections:

- **2.2:** How may nature's diverse values be conceived and categorized?
- **2.3:** What frameworks help organize and communicate value systems?
- **2.4:** What factors affect value expressions in individual actions and collective decisions?
- **2.5:** How can value formation and change be understood as dynamic processes?
- **2.6:** What do this chapter's findings offer to the IPBES, policy and this assessment on values?

2.1.2 Characterizing different conceptualizations of nature's diverse values

The recognition of nature's diverse values is not new (Adams, 1940; Craig *et al.*, 2019) (see 1.1.2). Environmental research and policy communities have worked for several decades to operationalise the ecosystem services concept and methodology to help quantify how nature positively and negatively affects humans (e.g., ecosystem services and disservices) (Campagne *et al.*, 2018; Gómez-Baggethun *et al.*, 2010; TEEB, 2010a; Vaz *et al.*, 2017). During the 2000s, the millennium ecosystem assessment (MEA, 2005) consolidated and globalized this approach. The United Nations-led report conceived ecosystems as natural capital with benefits (and costs) for human societies insufficiently reflected in market transactions and public payments. As such, nature's instrumental and intrinsic values (see 2.2.3) were highlighted, which allowed ecological and economic research to better inform the biodiversity and sustainability science-policy interface (e.g., FAO, 2020; Foundation for Sustainable Development, 2021; Harte Research Institute for Gulf of Mexico Studies, 2020).

However, the ecosystem services framework is also critiqued from multiple perspectives; IPBES assessments, therefore, use the broader notion of nature's contributions for people (which considers ecosystem services but also other ways to frame human-nature relations) to bridge these multiple considerations (e.g., IPBES, 2018a, 2018b, 2018c, 2018d, 2019). For example, when represented as benefits using stock and flow models, ecosystem services may not capture the complexity and uncertainty of ecological systems (Norgaard, 2010). They also may overlook indigenous and local knowledge perspectives that present more embodied and relational understandings of human-nature connections (Díaz *et al.*, 2018a; Raymond *et al.*, 2013). Furthermore, the ecosystem services approach risks giving insufficient attention to ethics of care, reciprocity and responsibility, grounded in the relationships between people and nature (Chan *et al.*, 2016). At the same time, the ecosystem services framework has multiple strengths; it can enhance communication, promote understanding of human-nature relationships and support coordinated actions (Jax *et al.*, 2018). However, seeking to mainstream concepts like ecosystem services requires a commitment to considering diverse socio-ecological contexts and place-based biocultural interactions, more diverse values like justice, as well multiple paths and methodologies for tackling the complexities of environmental problems across varying contexts (Jax *et al.*, 2018).

Given the diverse ways of understanding nature's values, Chapter 2 conducted a scoping review of 40,133 academic documents[4] published since the millennium ecosystem assessment (MEA, 2005). While ecosystem services predominate in academic articles (see 2.3.1), research on nature's diverse values has increased across a range of topics (see **Figure 2.3A**). Most studies address biophysical themes, but the greatest increases were registered for economic and indigenous and local knowledge topics. These studies are mostly published in life and physical sciences journals, but a substantial proportion is found in interdisciplinary fora (see **Figure 2.3B**). Studies about socio-cultural topics were the second-most numerous, published largely in social science journals and less so in interdisciplinary outlets. While ecosystem service reviews tend to criticize a bias towards economic values of nature (Schröter *et al.*, 2014) a more expansive set of search terms demonstrate the diverse conceptualisations of nature and its values across different academic traditions. However, such more expansive notions have had less prominence in environmental policy discourse[5].

The academic traditions are different ways of characterizing nature and its values and put emphasis on particular dimensions of nature and human-nature relationships:

- **Biophysical** studies mostly conceive nature's values as stocks and flows of materials, organisms or energy (see 2.2.4). For example, ecology investigates nature's components (e.g., species diversity, carbon standing stocks) and processes (e.g., hydrological cycles, state-and-transition models) (Barton & Harrison, 2017).

4. Literature review on multiple values concepts in academic literature (https://doi.org/10.5281/zenodo.4396319).
5. Literature review on multiple values concepts in academic literature (https://doi.org/10.5281/zenodo.4396319).

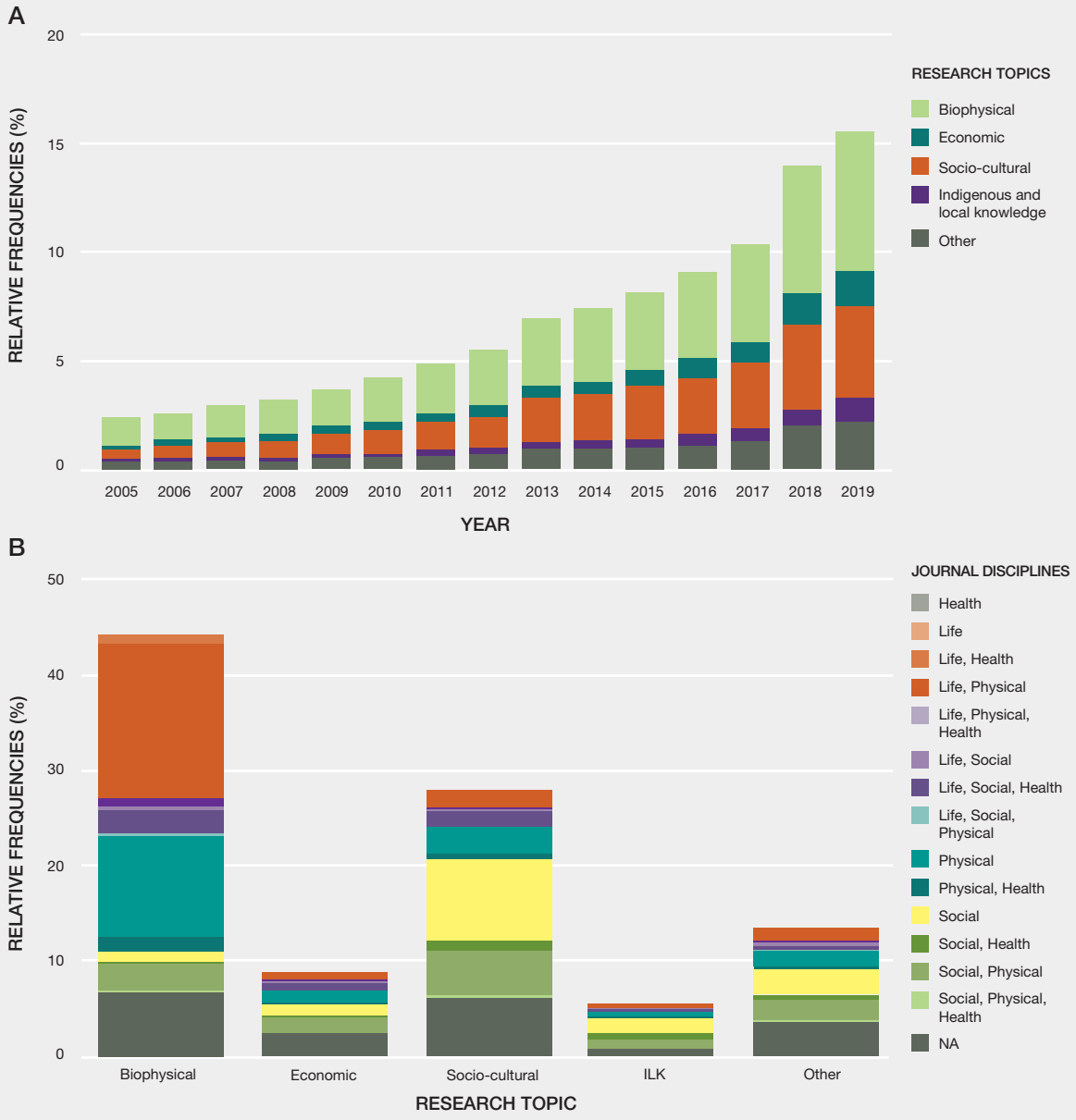

Figure 2 3 **Review of the diverse values of nature.**

Chapter 2's Stage III literature review[6] identified 40,133 abstracts in Scopus about nature's diverse values. Data are presented as each analytic category's relative frequency (%) in the entire database. **(A)** An artificial intelligence (AI) algorithm produced 60 categories that were manually classified by the predominant research topics for each, resulting in 46 assessment-relevant categories (30 biophysical, 3 economic, 6 socio-cultural, 1 ILK, and 6 'other' that did not fit one single type of topic). **(B)** Journal disciplinary domain was based on self-identified categories in Scopus: life, physical, health, social sciences or an interdisciplinary combination. NA are journals that did not self-report a discipline.

Foundational to ecosystem services, this domain quantifies nature´s contributions to people from life-support processes, including biogeochemical cycles and pollination, which underlie many material and regulating nature´s contributions to people (Ehrlich & Mooney, 1983; Seppelt *et al.*, 2011).

Economic approaches typically characterize nature's values through individual preferences under a utilitarian framing (e.g., willingness-to-pay) (see 2.2.4) and have been developed for making ecosystem services trade-offs and measuring relationships to well-being in economic terms (TEEB, 2010a). This domain provides various policy-relevant distinctions like use and non-use values (e.g., bequest values) and has been successfully applied to some policy instruments (e.g., environmental

6. Literature review on multiple values concepts in academic literature (https://doi.org/10.5281/zenodo.4396319).

taxes, payments for ecosystem services (Gómez-Baggethun *et al.*, 2010) (see 2.2.3).

- **Socio-cultural** studies, including a broad suite of social sciences (e.g., sociology, anthropology, political sciences) and the humanities (e.g., philosophy, history, literature) often consider non-material nature´s contributions to people. Research has focused on cultural ecosystem services like recreation and tourism (Plieninger *et al.*, 2013; Scholte *et al.*, 2015), and studies increasingly address broad values like care, reciprocity and responsibility (see 2.2.3.1). Understandings of value vary across research paradigms, including social constructionism and social phenomenology. Each paradigm is guided by different theories of value and behaviour, including those that seek to understand the value-basis of environmental beliefs and behaviour or those that seek to understand values as practices (see 2.2.1).

- **Health** is a multidisciplinary field of study, incorporating elements from biophysical (e.g., disease transmission), economic (e.g., disease costs due to lost productivity) and socio-cultural (e.g., relationships between gender and disease) domains. For example, the 'one health' concept spans medicine, psychology, epidemiology, economics, veterinary sciences and ecology (Hasler *et al.*, 2014). The linkages between environmental and human health include physical, mental, spiritual and social benefits that can be accounted for in the design and implementation of policies, particularly in urban areas (Hartig *et al.*, 2014; Tillmann *et al.*, 2018).

- **Indigenous and local knowledge** (ILK) studies consider nature's values being context-specific or place-based, rather than generalized understandings of 'humans' or dominant socio-demographic groups. This domain recognizes indigenous peoples and local communities (IPLCs) not only as 'subjects' of research, but also agents who produce and validate their own knowledge(s) (Smith, 2012)[7].

The IPBES conceptual framework recognizes that the values of nature are conceived and justified based on multiple cultural and academic traditions (Díaz *et al.*, 2015; IPBES-2/4). Each knowledge tradition highlighted above gives particular concepts and analytic depth appropriate for different situations (Díaz *et al.*, 2018a; Pascual *et al.*, 2017). This chapter provides guidance on how to use different approaches to characterize nature's diverse values, which arise from the different lenses through which people interpret and experience human-nature relationships (i.e., worldviews). As a result, diverse values have different meanings across knowledge systems, cultures, languages and socio-ecological contexts (see 2.2.1, 2.2.3). Often, this diversity cannot be reduced to unidimensional conceptualisations, but rather needs to be considered through multiple layers, such as nature's ethical and cultural importance. In this chapter, the reader will find typologies and frameworks to identify and organize the diversity of values, showing areas of convergence and overlap, fuzzy conceptual boundaries and points of difference. These characterizations are grounded in the 'relational turn' in environmental policy and decision-making, which recognises not only the instrumental and intrinsic values of nature, but also principles embodied in relationships between humans and the other-than-human world (Chan *et al.*, 2012; Hart, 2010; Raymond *et al.*, 2013; 2017b; Zafra-Calvo *et al.*, 2020).

2.1.3 Assessing different conceptualizations of the values of nature

Scoping, critical and systematic review methods were used to identify, screen, select and evaluate literature (Grant & Booth, 2009; Moher *et al.*, 2009; Pham *et al.*, 2014). To confront the regional-biases in evidence, publications in languages other than English were sought. A three-staged approach was used to obtain information (see *data management reports* for methodologies).

- **Stage I** consisted of a systematic literature evaluation of review articles about nature's values indexed in Scopus from 2005 to present[8]. Initial relevance screening determined 713 publications to evaluate. Delimiting this time period allowed quantification of publication trends since the millennium ecosystem assessment (MEA, 2005), given its pivotal academic and political role in consolidating the ecosystem services paradigm (Larigauderie & Mooney, 2010).

- **Stage II** protocols incorporated earlier publications and seminal sources cited in Stage I[9] (snow-ball technique). New searches included: (i) disciplines and approaches that are underrepresented in global databases (e.g., humanities) (Mongeon & Paul-Hus, 2016); (ii) individual keyword searches for specific topics (e.g., intrinsic, instrumental, relational values; worldviews; behaviour theories; human-nature relationship frameworks; different types of decision-making; fisheries at the global

7. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).

8. Systematic review on the conceptualizations of values (https://doi.org/10.5281/zenodo.4071755).

9. Systematic review on the conceptualizations of values (https://doi.org/10.5281/zenodo.4071755).

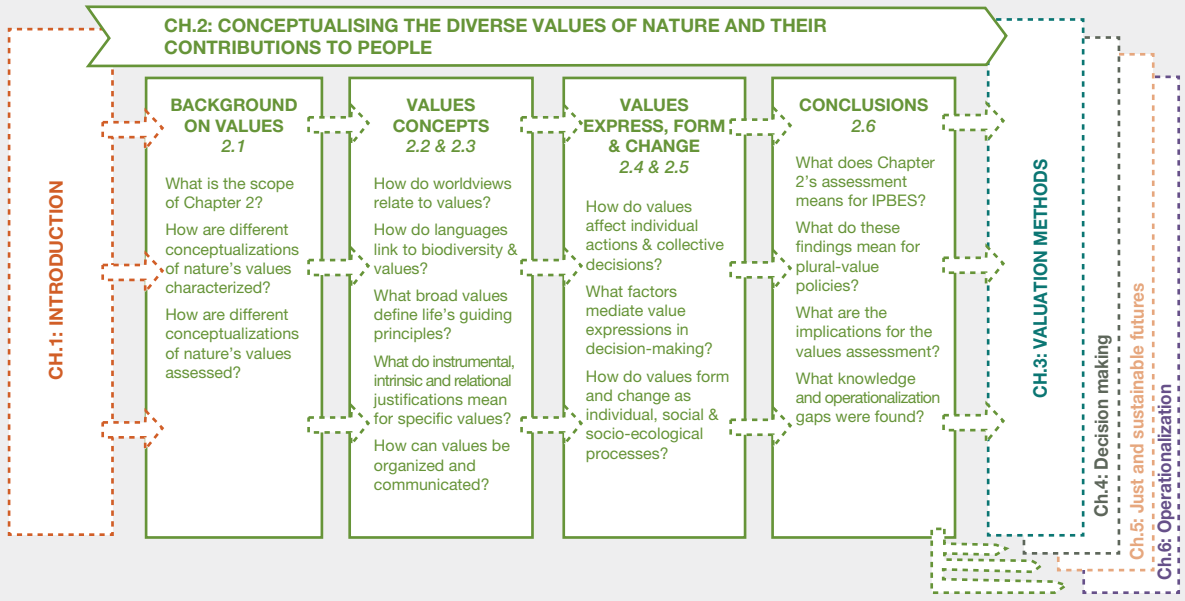

Figure 2 4 **Road map to Chapter 2.**

The sections of the ensuing chapter answer specific questions and develop key concepts that enable decision-makers to more rigorously, effectively and ethically engage nature's diverse values in policy.

scale)[10, 11, 12, 13, 14]; (iii) policy documents from national biodiversity strategies & action plans and other major biodiversity reports[15] (see Annex 2.2); (iv) indigenous and local knowledge sources, obtained from academic literature reviews and a call-for-contributions directed mainly to IPLCs and indigenous scholars from around the world (which was used both for the values and the sustainable use of wild species IPBES assessments)[16, 17, 18] and (v) contributions from *values assessment* experts and contributing authors[19].

- **Stage III** identified 148,082 publications by applying Stage I's search string and date range, but without filtering results for review articles and including agricultural studies. Given the database's size, abstracts were analysed with an artificial intelligence algorithm that created 60 research topic categories. Manually coding these produced a final total of 43 categories with 40,133 abstracts [20].

- **Case studies** and examples were chosen for illustrative purposes. While there are infinite possible cases, those selected represent core concepts, span geographic regions and address common themes. These include an assessment-wide case study on ILK-based socio-political processes related to Philosophies of good living found worldwide (see **Box 2.4**; see 1.4.2) and three chapter-wide case studies on (a) local knowledge and coastal fisheries management in the UK (see **Box 2.8**; Annex 2.4), (b) worldviews that affect land-use decisions about mining in India (see **Box 2.12**; Annex 2.5) and (c) values-articulating institutions and watershed management in the United States of America (see **Box 2.10**; Annex 2.6).

Combining these strategies, this chapter builds upon previous scholarship and governance practices, particularly the ecosystem services research-policy tradition (TEEB, 2010a), other global assessments (IPBES, 2019c; MEA, 2005) and relevant policy documents (e.g., national biodiversity strategies & action plans, the 2030 Agenda for Sustainable Development, the draft of the targets of the post-2020 global biodiversity framework, (Convention

10. Systematic review of value types (https://doi.org/10.5281/zenodo.4396289).
11. Literature review on the diverse perspectives on fisheries at the global scale (https://doi.org/10.5281/zenodo.4399386).
12. Literature review on value articulating institutions (https://doi.org/10.5281/zenodo.4399373).
13. Behaviour theories literature review (https://doi.org/10.5281/zenodo.4399396).
14. Literature review regarding values, valuation and decision-making (https://doi.org/10.5281/zenodo.4396349).
15. Analysis of national and international policy documents related to biodiversity and sustainability (https://doi.org/10.5281/zenodo.4399907).
16. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).
17. Call for contributions on indigenous and local knowledge (https://doi.org/10.5281/zenodo.4390417).
18. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).
19. Analysis on contributions on interconnections between languages, biodiversity and values (https://doi.org/10.5281/zenodo.4399917).
20. Literature review on multiple values concepts in academic literature (https://doi.org/10.5281/zenodo.4396319).

on Biological Diversity, 2021; United Nations, 2015)). Using these data, the chapter's sections (see **Figure 2.4**) assess different conceptualizations of the values of nature across academic, policy and sociocultural contexts to better recognize, communicate and incorporate diverse values in decision-making (see 2.1). A typology was developed to introduce core concepts, including worldviews, broad values, specific values and value indicators (see 2.2). To organize this complexity, four life frames are presented to illustrate how particular human-nature relationships prioritize certain sets of values (see 2.3). Since multiple factors condition value expression in individual and collective decisions and actions, detailed attention was given to how values are embedded in the norms and legal rules that constitute social, political and economic processes and contexts (see 2.4). Moreover, values formation and change can be understood as a dynamic process, for which information was combined to understand these individual, social and socio-ecological processes (see 2.5). Finally, the chapter's findings are used to inform broader IPBES efforts and their relevance for plural-value policies (see 2.6). The chapter's annexes present additional information, evidence, examples and contextualization for the diverse concepts and policy-implications addressed in the main text.

2.2 TOWARDS A MORE INCLUSIVE UNDERSTANDING OF THE DIVERSE VALUES OF NATURE

This section explores how interacting value concepts and dimensions, categorized as worldviews, broad values, specific values, preferences and indicators, help interpret different ways of understanding what humans consider 'good' and 'important' in their experiences and interconnections with nature **(Box 2.1)**. The values typology covers the following core concepts:

- **Worldviews** embody different knowledge systems, languages and perspectives about human-nature relationships (see 2.2.1). They have a critical role in shaping how values are constructed, expressed and assessed in science and society (see 2.2.2) **(Boxes 2.2, 2.3)**. Worldviews also respond to changing lifestyles and the displacement or loss of local languages as evidenced by a significant reduction in ecoliteracy globally (see 2.2.2) **(Box 2.3)**.

- Different **broad** and **specific values** can co-exist (see 2.2.3, 2.2.4). Considering this diversity of values can help build mutual understanding of environmental challenges; make otherwise neglected, intangible costs and benefits more visible; facilitate a more robust, inclusive and just articulation of values; and increase the socio-environmental acceptability and adoption of policy interventions.

- Values can be assessed using various **indicators** or preferences (see 2.2.4). How biophysical, monetary and socio-cultural indicators are assessed, combined or compared influences whose voices are heard in development and environmental decision-making.

- **Life frames** of nature's values (e.g., living from, living with, living in and living as nature) provide a way of organizing and communicating the complexity of values and values concepts (see 2.3). Each life frame is associated with different understandings of human-nature relationships that often overlap and can express different sustainability-aligned values.

2.2.1 Worldviews, knowledge systems and values of nature

Worldviews are forged through the dynamic interplay between individuals, social groups, and place in both biophysical and built environments, beginning in early childhood and being configured by situations encountered and roles enacted throughout one's life. Multiple factors shape worldviews, including knowledge systems, languages (see 2.2.2), and religion (see **Box 2.2**) (Koltko-Rivera, 2004). Worldviews can also be influenced by cultural encounters, such as through human displacement and migrations. They are expressed through social organization and governance structures, including norms, laws, and management systems (Gratani *et al.*, 2016; Nemogá, 2019; Vatn, 2015) (see 2.4). For example, the international conservation framework is dominated by worldviews that originated in Western societies, which often have a dualistic perspective of humans and nature, resulting in protected areas as a form of biodiversity management (Bartel *et al.*, 2020; Köhler *et al.*, 2019).

The diversity of worldviews challenges decision-making processes, which often encounter opposing or conflicting perspectives across different social actors connected to socio-environmental problems like urban transportation, watershed protection or mining (Chuang *et al.*, 2020). Power structures mediate the social dynamics of groups within worldviews, determining which worldviews are most represented in decision-making (see 2.4.2.3). For example, indigenous worldviews are often excluded from conceptualizations of development, including the Sustainable Development Goals (SDGs), which can lead to feelings of injustice or irrelevance among indigenous peoples (van Norren, 2020).

Box 2 1 Concepts used in Chapter 2 to understand nature's diverse values.

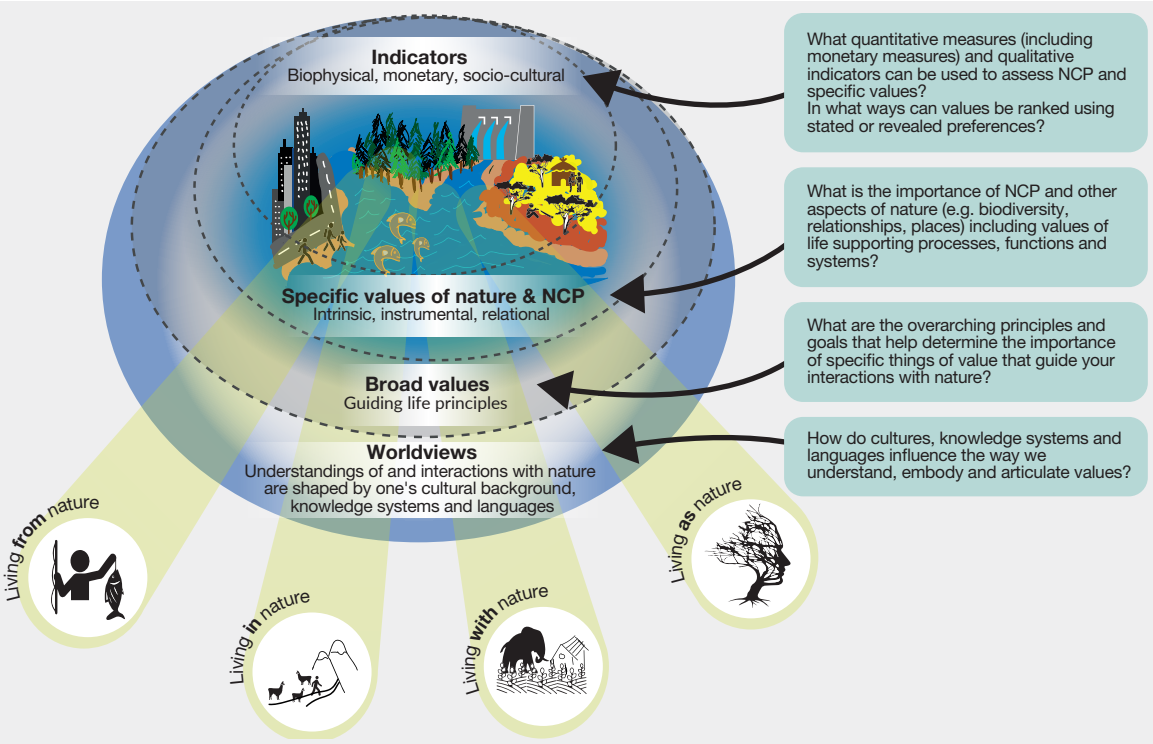

Figure 2 5 Value concepts developed in Chapter 2.

Worldviews, broad values, specific values, preferences and indicators relating to nature, nature's contributions to people and good quality of life can be depicted like the overlapping layers of an onion. Perspectives on how to organize these values, illustrated here by spotlights, are partially determined by one's life frames of nature, or the ways of being/living in the world that prioritize particular sets of values in specific valuation contexts.

Worldviews are like lenses through which individuals and social groups perceive, think about, interpret, inhabit and modify the world. Rooted in *cultural traditions* and *languages*, they help to shape people's broad and specific values (see 2.2.1, 2.2.3). They also guide perspectives on our conceptualization of and relationship with nature, based on underlying value systems – a set of ethical principles and beliefs that drive or guide individual and/or social behaviour (see 2.2.1).

Knowledge systems are cumulative bodies of knowledge, practices and beliefs, evolving and governed by adaptive processes and handed down and across generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.

Broad values are 'life goals' and 'guiding principles' informed by one's worldview and general beliefs, including what constitutes desirable human-nature relationships for a good quality of life (e.g., the desire for sustainability and justice). Broad values span particular contexts, but originate in and arise from specific cultural settings, languages and places that affect individuals and collectives (see 2.2.3). Often embedded in a society's institutions (i.e., norms, rules), these values tend to be relatively stable (see 2.5).

Specific values are 'opinions' or 'judgements' regarding the importance of things or situations expressed in particular contexts (e.g., components of nature, human-nature relationships, aspects of well-being). Specific values are justified as instrumental, intrinsic and relational (see 2.2.3, 2.2.4). They can be activated, formed and changed via individual, social and socio-ecological processes.

Indicators are the 'quantitative measures' (e.g., money, hectares) and 'qualitative descriptors' (e.g., expressions, arguments, stories) of specific values. Value indicators are associated with valuation methods and can include preference-based indicators (e.g., willingness-to-pay). Three categories are used in this chapter: biophysical, monetary and socio-cultural. Health indicators were treated as part of biophysical, economic or socio-cultural categories, while ILK-holistic indicators are part of the socio-cultural category (see 2.2.4).

Preferences denote 'stated' or 'revealed choices' of one or more alternatives over others and can be expressed in economic or sociocultural terms. Despite being considered synonyms for value in some disciplines (e.g., economics), preferences can be understood as rankings of possible outcomes in terms of their specific value to people (e.g.,

Box 2 1

preferences related to health and good quality of life) (see 2.2.4).

Life frames of nature's values illustrate the ways that people conceptualise, or frame, how nature matters. The four archetypes of living from, living in, living with and living as nature are not mutually exclusive. They offer a range of sources-of-concern for nature that can overlap or be emphasized in diverse contexts (see 2.3.2). Life frames are similar to value systems in that they inform the order and priority that an individual or group assigns to specific values in context.

Worldviews are foremost a cultural product, while there are also individual variations. For instance, a farmer may see land mainly as a productive input to crop production, while a neighbour may have a stronger symbolic connection to the land based on a long-term relationship with that specific place. These two individuals may belong to the same culture but hold distinct worldviews and values with regard to farming, which has implications for their decisions and actions.

Worldviews encompass and inform broad values (see 2.2.3). Broad values influence how different specific values of nature (see 2.2.4) are expressed and prioritized, thereby structuring human-nature interactions and influencing biodiversity outcomes. For example, certain indigenous and local food systems are strongly rooted in gender roles and built on the broad value of reciprocity, which could encourage sustainable production systems elsewhere (Huambachano, 2018; Mizuta & Vlachopoulou, 2017). Indeed, this link between worldviews and actions was supported by a global study from 24 different countries that found people who had worldviews with pro-environmental values were more likely to endorse actions for mitigating global warming (Broomell *et al.*, 2015).

The literature on nature's values categorises worldviews in multiple ways. However, anthropocentric and bio- and eco-centric are most prevalent in both academic literature and policy documents (see Annex 2.2). While these worldviews have distinctive value orientations, there is a considerable amount of variation and overlap within and among them (see **Figure 2.6**).

- **Anthropocentric** worldviews prioritize humans, ranging from a narrow/strong human emphasis to weak/relational perspectives that do not deny non-human others (Hargrove, 1992; Norton, 1984). **Strong/narrow anthropocentrism** refers to human prioritization or superiority over other species. Under this worldview, humans are valued above nature (e.g., justifying the use of pesticides to increase crop yield despite costs to other species) (Deb *et al.*, 2010). Strong/narrow anthropocentrism is primarily associated with instrumental values. **Weak/relational anthropocentrism** refers to human values, but also recognises human dependence upon essential relationships to nature and other-than-human beings (Bannon, 2014; Plumwood, 1993). Weak/relational anthropocentrism is associated with both instrumental and relational values.

- **Bio- and eco-centric** worldviews emphasize nature's inherent or intrinsic value, in terms of individuals (e.g., each organism or species) and collectives (e.g., ecosystems). These worldviews consider living beings and the interdependent web-of-life as worthy of respect and important in decision-making (Callicott, 1989; Taylor *et al.*, 2020).

- **Pluricentric** worldviews, reflecting an emerging conception that aligns with relational values, focus on relationships between humans and other-than-human beings, as well as nature's elements and systemic processes, conceived as reciprocal, interdependent, intertwined and embedded (Gould *et al.*, 2019; Matthews, 1994; Saxena *et al.*, 2018). Further, what are sometimes termed cosmocentric worldviews share the relational qualities of both biocentric and pluricentric worldviews, but emphasise the separate roles that objects, humans, animals, land, water, and everything else plays in maintaining its place and the world itself (Lucero, 2018).

In three literature reviews of worldviews, anthropocentric worldviews were most represented in the values types review[21] and ILK review[22], whereas pluricentric worldviews were most represented in the Philosophies of good living review[23] (see **Figure 2.7**). Instrumental values were most closely associated with strong anthropocentrism, while instrumental and relational values were most associated with weak anthropocentrism. Intrinsic values were associated with bio- and ecocentric worldviews, and relational values were most associated with pluricentric worldviews. These results are based on reviewed literature and do not necessarily reflect the global real-world prevalence of worldviews, as the academic literature can have several biases towards certain types of knowledges and languages that underlie worldviews (Mongeon & Paul-Hus, 2016).

21. Systematic review of value types (https://doi.org/10.5281/zenodo.4396289).
22. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).
23. Literature review for the philosophies of good living (https://doi.org/10.5281/zenodo.4399544).

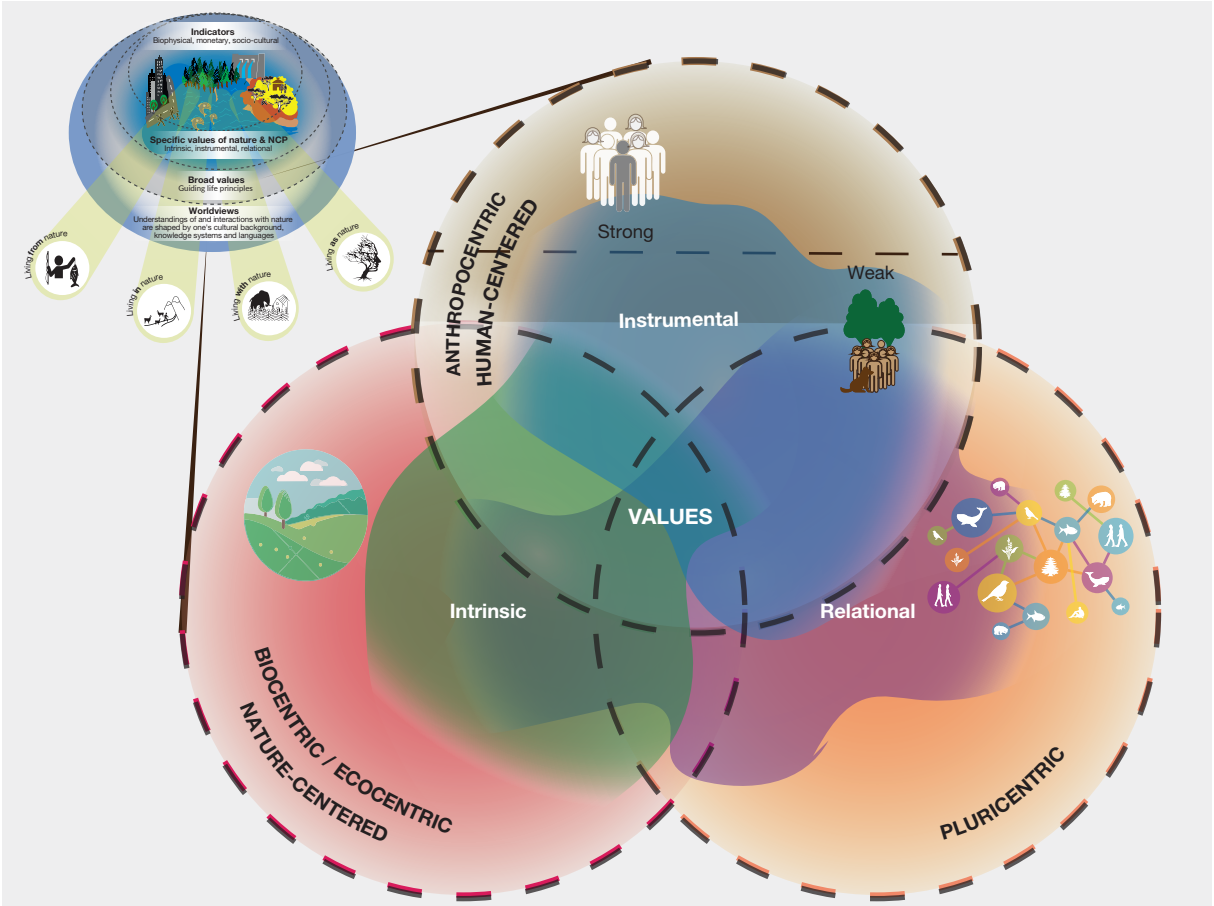

Figure 2 6 **Worldviews and values.**

Worldviews act as lenses through which humans perceive, conceive, inhabit and shape the natural world. Based on the literature, human-nature worldviews can be organized in three main types: anthropocentric worldviews (humans at the center); bio- or ecocentric worldviews (animals, plants and other beings, ecosystems and ecological processes at the center); and pluricentric worldviews (no center, the main focus is on relationships among human and non-human beings, elements and processes). These worldviews can overlap and may also be connected to broad and specific values of nature, driving human behaviour and policy-making (see 2.2.3).

Knowledge systems, including academic ones, are context-specific, culturally embedded, differ intergenerationally, and are based on lived experiences. Attempts to make them universally applicable beyond these contexts can lead to power hierarchies that privilege dominant groups or delegitimize those less powerful (Saxena *et al.*, 2018). Knowledge systems can also vary based on different lived experiences and societal roles. For example, gender can affect knowledge and values through specific interactions with the environment, which has been well established by our literature review[24, 25, 26], where 32/35 papers establish gender differences in values, attitudes, or ecological knowledge such as that about wild plants, fish, amphibians, and agro-ecological food systems and markets.

Regarding values, an important difference among knowledge systems is whether values are seen as: (i) distinguishable, persistent, self-existent mental constructs (as is common in economics and social psychology) or (ii) dynamically constructed in-context (as is common in humanities, qualitative social sciences, and indigenous peoples and local communities) (Kenter *et al.*, 2019). Results of survey research conducted among experts of this assessment revealed clusters with divergent views, regarding knowledge validation and confirmation (Hakkarainen *et al.*, 2020), which has different implications for implementing diverse value assessments (see Annex 2.7).

The spectrum of worldviews, knowledges and values of nature represented in humanity is multifaceted, overlapping

24. Systematic review of value types (https://doi.org/10.5281/zenodo.4396289).
25. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).
26. Literature review for the philosophies of good living (https://doi.org/10.5281/zenodo.4399544)

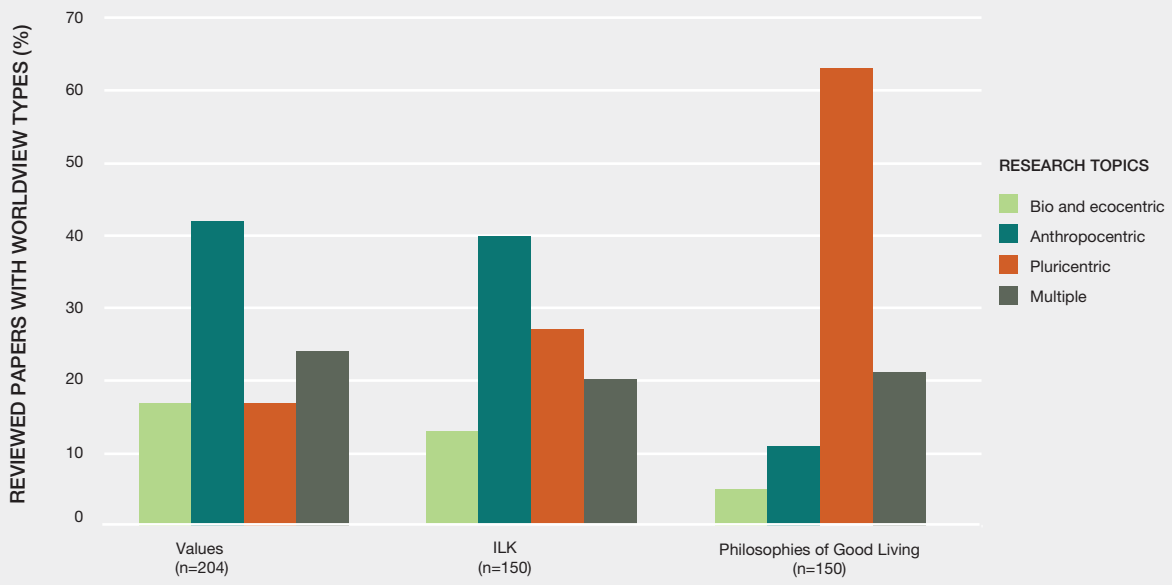

Figure 2 7 **Worldviews detected in three literature reviews, referred to as value types, ILK and Philosophies of good living.**

The columns are reported as relative frequency (%) of each worldview type as a function of the total number of papers (n) for each literature review.

and dynamic. Although, as noted, the academic literature reflects a particular polarization between those values held by certain groups, such as indigenous peoples and local communities, Eastern and Western knowledge, science and society; however, there may be considerable overlap between these groups' broad and specific values, which could be explored in more depth in research and policy. Also, due to language and power barriers, philosophy and philosophers from IPLC and the East are less widely read and cited (Ali, 2020). Taking knowledge as one of humanity's shared resources that does not know national, cultural and social boundaries, there is an obvious intersection and communication of philosophical thoughts of diverse ethnicities across the East and West (Ali, 2020). For example, emerging social norms, collectives and movements around mindfulness (see example below), urban nature (e.g., cultivating gardens to attract pollinators, recycling organic waste and planting food in cities) and climate change (e.g., the youth-led movement Fridays for the Future). Each of these initiatives may nurture and share relational values of reciprocity, care, responsibility and interconnectedness with nature (among others) within and across various societal groups, independently of how/if they can be categorized as Eastern, Western or IPLC. Convergences of worldviews and values across different groups, including religions, can be catalysed through decision and policymaking to promote biodiversity conservation, sustainability-aligned values or pro-environmental behaviour (Taylor *et al.*, 2020) (see 2.2.3; 2.3.1; 2.5.2).

Dialogue and convergences across ILK worldviews and other knowledge systems can emphasize overlapping themes, with special attention to how certain indigenous traditions may open different perspectives on how diverse beings relate to one another (Whyte, 2020). Whether the beings are understood as humans, ecological flows, fish, forests, societies, rivers, plants, whales or spirits, the moral bond of responsibility with these beings can also unite justice and sustainability and guide humans toward policy-options that can lead to futures where biodiversity engenders mutual well-being across all beings (see Annex 2.17). Similarly, the Buddhist concept of mindfulness entails intentional, non-judgmental attentiveness to the present (Wamsler, 2018) and has been adopted by the wellness industry in western cultures as a way to *live in nature* (Frank *et al.*, 2020). More broadly, mindfulness practices in psychology, medicine, businesses and sports have been shown to contribute to human functioning, raising awareness, emotional intelligence, and other cognitive-emotional functions (Frank *et al.*, 2020; Hayes *et al.*, 2006; Niemiec, 2014), and also have the potential to support sustainability-aligned values (Fischer *et al.*, 2017; Raymond & Raymond, 2019; Wamsler, 2018).

Box 2.2 Worldviews, religion and values.

Religions are important institutions (conventions and norms) that shape and are shaped by worldviews (see Annex 2.3). Worldviews typically include stories from science, religion or a fusion of both about how the world came to be. Worldviews also include broad values as normative statements about what conditions and goals are good or bad, what actions are right and wrong, and what means are permissible when pursuing good ends or preventing bad outcomes.

Researchers increasingly maintain that religious beliefs evolve, along with emotional traits and aesthetic sensibilities, including perceptions that nature is beautiful. These scholars argue that such characteristics co-evolve with values and practices and are passed to future generations because they promote healthy and resilient human-nature connections (Rappaport, 1979; Wilson, 2002). Religions can also directly promote environmental sustainability and biodiversity conservation. There is evidence, for example, that indigenous traditions are more likely than the world's predominant religions to express kinship with non-human organisms and have values that promote biodiversity conservation (Berkes, 1999; Nelson & Shilling, 2018; Taylor *et al.*, 2016; Wilson, 2002). Meanwhile, many religious and non-religious people have developed deep feelings of belonging to nature and inter-species kinship. Among the non-religious, such values and perspectives may be gained through personal human-nature experiences or through the evolutionary sciences, which demonstrate that all species are genetically related (van Horn *et al.*, 2021).

However, research also shows that religious worldviews may often hinder societies' ability to live sustainably within the ecosystems they emerged from and depend upon (Taylor *et al.*, 2016). Beliefs that deities or divine forces control environmental systems, for example, can occlude interest in and understanding about how such systems work. Moreover, many religions are anthropocentric, viewing humans as morally and even spiritually superior to other species, which hinders concern for biodiversity conservation, in part because their priority is on meeting the spiritual needs of human beings (Taylor *et al.*, 2016).

In contrast, there is potentially significant convergence among people and religions toward perceptions that life on Earth is sacred and worthy of reverent care. Such views are being expressed and promoted in a host of ways, through religious education, ceremonies and projects, as well as through the arts and sciences (Sponsel, 2012; Taylor, 2010, 2021). The convergence toward pro-environmental worldviews via religious institutions has potential to contribute to mitigating anthropogenic extinctions and addressing the climate crisis.

As an institution (i.e., a set of conventions and norms), religion also illustrates feedbacks shaping contrasting worldviews that may either hinder or promote biodiversity conservation (see **Box 2.2**). Like institutions, languages are among the factors that shape worldviews. Concepts used to refer to human-nature relationships are expressed in languages and are often connected to the contexts and places where these relationships take place across different human cultures. In the next section, we discuss the connections between languages, values and biodiversity.

2.2.2 Languages, values and biodiversity

Worldviews and values may be expressed through actions, attitudes and practices, as well as through languages in sign, oral and written forms. Worldwide, languages capture, maintain, transmit and convey values, knowledge and practices that support biodiversity and nature's contributions to people connected to specific places and territories, species, ecosystems and landscapes (Frainer *et al.*, 2020; Inglis & Pascual, 2021; UNESCO & CBD, 2010). Linguistic diversity may be used as a proxy for both cultural and values diversity (Reiter, 2018). Previous IPBES assessments (IPBES, 2018a, 2019a) highlighted the co-occurrence of biodiversity and linguistic diversity in the world's biocultural regions (see **Figure 2.8**). Furthermore, biodiversity and human languages both face critical and interlinked crises. It is estimated that around 40% of the world's approximately 7,139 "living languages" are extinct or endangered, and about half of the languages currently spoken will likely disappear by the end of this century (Eberhard *et al.*, 2021; Harrison, 2007).

With every disappearing language, we also lose values, ideas, concepts, ways of knowing and talking about the world, leaving the world poorer and humanity more vulnerable to coping with uncertainty and adapting to socio-environmental change (Frainer *et al.*, 2020; Harmon, 2002; Harrison, 2007; Maffi, 2002; Moseley, 2010). Importantly, this dual *diversity crisis* has reciprocal effects between humans and nature, since cultural change (including language erosion or loss) can be thought of as a form of co-evolution between cultural information and the socio-ecological environment in which people live (Smith, 2001) (see **Box 2.3**). For example, in France and Spain's Basque-speaking region, local relationships with mountain forests were conveyed through the significance of relational values as expressed in Euskara (Basque language) to highlight the connection between cultural identity and place attachment (Inglis & Pascual, 2021). These findings have important implications for integrating environmental and language policy in Spain, in connection with local values maintained by and transmitted through the Basque language.

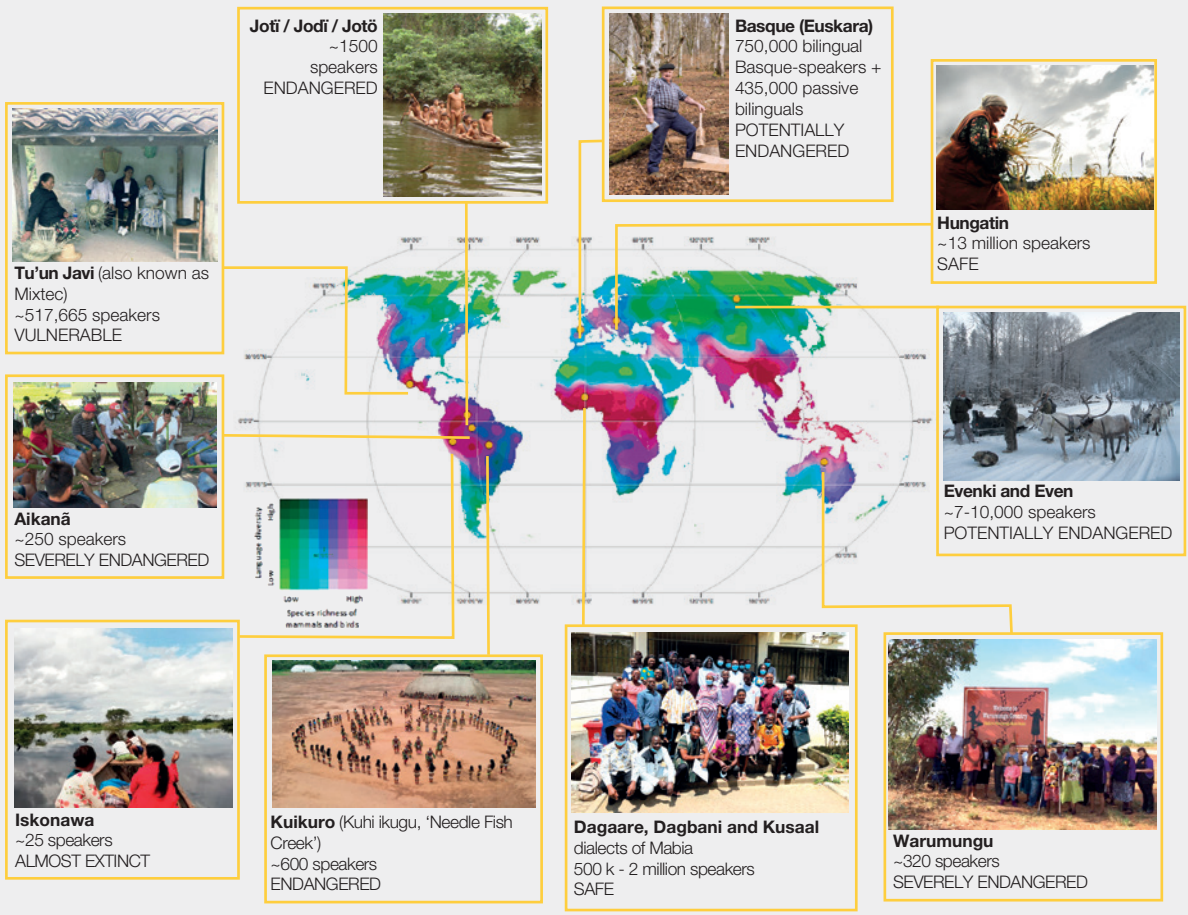

Figure 2 8 **Linguistic diversity and case studies within the chapter.**

The map from the IPBES *land degradation assessment* (IPBES, 2018a) shows the global overlap between linguistic diversity (number of spoken languages) and biodiversity (number of mammal and bird species). The sites marked with yellow dots represent the places where linguists, language specialists and ILK holders who contributed reviews, focused their case studies for this chapter (see Annex 2.8).

In the academic literature, more attention has been paid to the interconnections between biological, cultural and linguistic diversity, reflected in the concept of *biocultural diversity* (Frainer *et al.*, 2020; Gorenflo *et al.*, 2012; Maffi, 2005); than to the role of languages in shaping values of nature (Inglis and Pascual 2021). Knowledge gaps exist regarding the connections between human languages, values of nature and biodiversity conservation[27, 28, 29] (see 2.6). Only 12.6% (19 of 150) of ILK-focused reviewed articles directly address language as an important vehicle to teach, transmit and maintain values associated with nature. Aiming to shed light on the specific connections between languages and values, contributing authors from around the world were engaged to conduct complementary reviews and indigenous peoples and local communities were consulted to provide their own sources. These efforts resulted in policy-relevant insights on the intersections between languages, biodiversity, and values of nature, summarized in **Figure 2.9**; **Table 2.2**; and Annexes 2.9 and 2.10.

- Languages can store and transmit broad values, social norms and/or ethical principles. Broad values, including beliefs, taboos, and ethical principles, are found in words and concepts that are elicited and transmitted across generations through oral and written linguistic expressions, such as myths, stories, folktales, proverbs and sayings. Some examples of these guiding principles are found among many indigenous groups around the world, including the Anishinaabek,

27. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).
28. Literature review for the philosophies of good living (https://doi.org/10.5281/zenodo.4399544).
29. Analysis on contributions on interconnections between languages, biodiversity and values (https://doi.org/10.5281/zenodo.4399917)

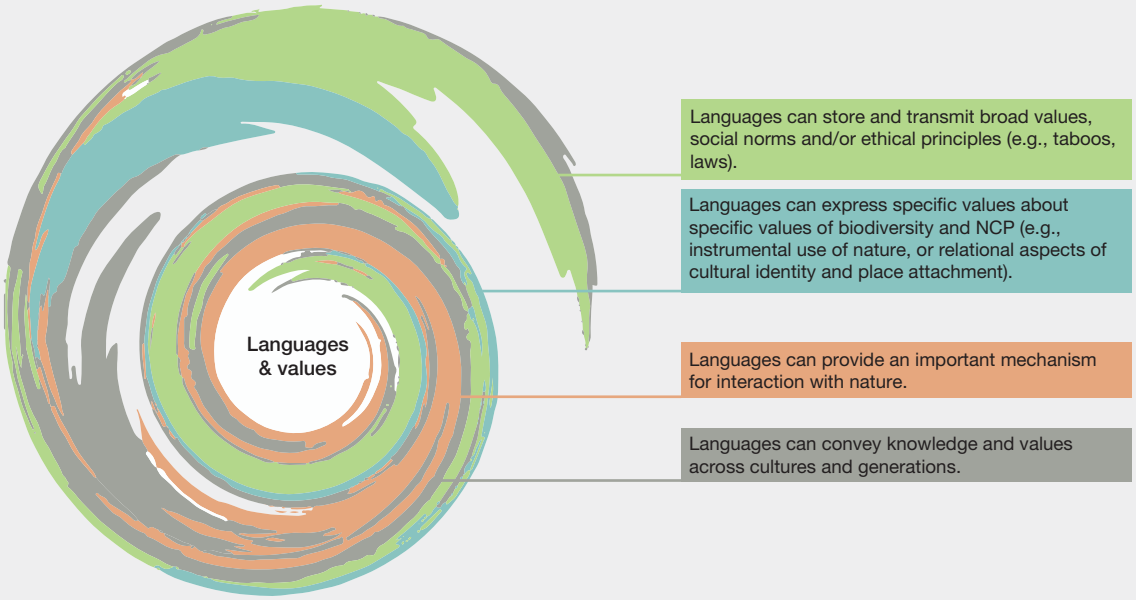

Figure 2 9 **Insights on the complex interconnections between languages, biodiversity and values of nature.**

These exploratory categories emerged from literature reviews and contributing authors. The waves represent fluid, overlapping and dynamic relationships between these different topics.

Hawai'ian groups, Maya, Quechua, Aymara, Kichwa, Maori, Yawuru, Bemba, Mbyá guarani, Inuit, and Haudenosaunee. Among the Anishinaabek in the United States of America, the value of 'respect for the spirit in all things is rooted in indigenous legal orders', and is denoted by the expression *mino-mnaamodzawin* (McGregor, 2018).

- Languages can express specific values of biodiversity and nature's contributions to people. Languages are inseparable parts of people's identities and values connected to other than human beings, places, rivers, mountains, territories, sacred sites and landscapes. The idea that all life or creation is interconnected and interdependent, existing as kin, was present in 29.4% of articles (10/34 articles) analysed for the Philosophies of good living literature review. It includes relational values like equity, reciprocity, interdependence and intergenerational connectedness (Mohatt *et al.*, 2011; Ullrich, 2019), expressed, for instance, through a Bemba saying in Zambia that *"the land is me"*, as opposed to *"the land is mine"* (Spencer, 2018). For example, the worldview of the Kichwa people from Sarayaku, Ecuador, reflects reciprocity with and respect for the land and spiritual beings: Kawsak Sacha is the living forest, a conscious living being who is the subject of rights and is inhabited by Runayuk, beings that protect ecosystems, animal and plant species (Pueblo Originario Kichwa de Sarayaku, 2018).

- Languages are also the storage of important knowledge about nature and biodiversity including instrumental values connected to nature's contributions to people. This includes medicinal plants, food, and other biocultural diversity products, as well as the benefits they provide, tied to specific biocultural contexts. Under this perspective, biocultural diversity may be considered both a form of value and an approach to valuation, where value is manifested as a combination of the tangible and intangible aspects of nature (Bridgewater & Rotherham, 2019; Merçon et al., 2019). Cámara-Leret & Bascompte (2021) found that most medicinal knowledge is linguistically unique, and that indigenous languages are singular reservoirs of threatened medicinal knowledge. Among the Aikanã people of Brazil, the position and social role of individuals in society may be connected to a highly detailed lexical and medicinal knowledge of plant species (see Annex 2.8).

- Languages can provide an important channel for interaction (mediation) with nature. This relates to ways of understanding, speaking about, interacting and communicating with other-than-human beings and nature. It also refers to ecoliteracy, or knowledge about nature that is not necessarily learned in schools and books, but in close contact and experience with nature (Harrison, 2007) (see **Box 2.3**). For example, among the speakers of the Warumungu language in Australia,

Table 2.2 **Synthesis of information provided by specialists for languages spoken in ten different places around the world (see Figure 2.9 and Annex 2.8).**

The information provided is applicable to most cases. Particularities are noted through the specific designation of the language and country in which it is spoken.

VALUES OF NATURE IN LANGUAGE **Role in formation and transmitting biodiversity, worldviews and related values.**	EFFECTS OF LANGUAGE LOSS ON NATURE'S VALUES **Links between loss and erosion of language and its impact on values and biodiversity.**	POLICY OPTIONS AND IMPLICATIONS **Policy connections and options for integrated approaches between biodiversity conservation, environmental valuation, and language's rights, protection and/or revitalization.**
• Way to name, categorize, store, and transmit nature's values, knowledge and relationships. • Worldviews, beliefs, and values are coded in language through mythology. • Means to rediscover human-nature bonds and reconnect with values of equity, respect and care with nanao *ñu'u (our mother)*, in the Tu'un Javi language (Mixtec, Mexico), which recognizes seven types/names for rain. • Humans and biodiversity are considered as kin, connected through horizontal relationships with equal rights. *Buga* is the biophysical environment inhabited by spirits and spiritual entities governing nature (Evenki/Even, Siberia). • Behavioural rules and ethical principles are coded in language. • Values coded in folktales/proverbs/songs (Dagaare, Dagbane and Kusaal dialects of Mabia, various African countries). • No word for nature. Active fabrication and maintenance of forests/biodiversity underlie *jkyo jkwainï* philosophy: to love-care all-everybody that surrounds us (Jotï / Jodï / Jotö, Venezuela).	• Erosion of values and ancestral knowledge coded in taboos, rules, beliefs, and cultural notions contained in narratives that promote environmental conservation. • Drivers of language loss: Colonization, discrimination, racism, ban/ and or replacement by dominant languages, violence, prejudice, migration, assimilation, ethnic shame, displacement, lifestyle changes (e.g. nomadic to urban/sedentary), mass media, TV, higher mobility to urban centres, missionaries, lack or inefficiency of governmental policies. • Lexicon impoverishment = loss of knowledge and values associated with them. Broken chain of transmission between generations. Medicinal plant knowledge being lost (Kuikuro and Aikanã speakers, Brazilian Amazon). • Language loss threats: security, health, territoriality, mining, colonization, and inequalities: assimilation, racism, discrimination, appropriation. No effective way to transmit values/ILK without native language (Jotï / Jodï / Jotö, Venezuela).	• Developing and implementing integrated valuation processes connecting languages and/or dialects with biodiversity/ nature's contributions to people /nature elements and processes. • Ensuring territorial protection, supporting traditional livelihoods, and self-determination of IPLCs. • Integrating language aspects into policies for territorial management, protection, production landscapes and/or conservation. • Promoting endangered languages education in formal and informal education. • Promoting specific programs to enhance ecoliteracy and intercultural education and understanding in urban and rural spaces. • Institutionalizing language rights and developing/and/or strengthening policies toward language documentation, learning and transmission. • Articulating language rights in national and international policies for biodiversity conservation (e.g. CBD, RAMSAR and others), sustainable development (e.g. SDGs) and climate change (e.g. UNFCCC).

habitat-based classification is expressed through the suffix *-warinyi*. This designation has implications for interactions and relationships between humans and other-than-human beings, since, according to this worldview, all "dwellers" of a particular habitat (e.g., plants, animals, humans, etc.) have equal rights (see Annex 2.8).

Languages can convey knowledge and values across cultures and generations. Language is an important tool for improving intercultural communication, education and understanding within and across generations. Formal and informal intercultural educational programs are those that develop people's abilities to think, act, discriminate and experience cultural differences in appropriate ways (DeJaeghere & Zhang, 2008).

For example, in Australia, language teachers are encouraged to design teaching programs that assess student learning and knowledge development in using language, making linguistic connections and moving between cultures. These objectives for language programs are to be assessed at various stages of formal education (Moloney & Harbon, 2010).

The rapid loss of languages has impacts on peoples' ecoliteracy, livelihoods, cultural and territorial rights, and collective identities (see **Box 2.3**). National and international policies and legal instruments have historically approached cultural, linguistic, and biological diversity separately (Frainer *et al.*, 2020). Enhanced synergies and coordination would help implement national biodiversity plans as well as international agreements, such as the targets of

Box 2 3 Ecoliteracy: losing biodiversity means losing ways to value nature.

Much of what humanity knows about the natural world lies outside of books, academic knowledge, libraries, and databases, since it exists in unwritten language in people's concepts and memories of long-term co-existence with mountains, rivers, forests, deserts, and other ecosystems (Harrison, 2007). This combined experiential and academic knowledge is referred to as ecoliteracy. Evidence from the literature[30] shows ILK and ecoliteracy erosion among both IPLC and the broader society (Blanco & Carrière, 2016; Genovart *et al.*, 2013; Schwann, 2018; Shah & Bhat, 2019; Uchida & Kamura, 2020).

Indeed, ecoliteracy is eroding broadly, including among children in urban places, as people are increasingly distanced from nature, and biodiversity is being lost at rapid rates (Genovart *et al.*, 2013; IPBES, 2019d; Marouf *et al.*, 2015; Pilgrim *et al.*, 2009). Drastic changes in lifestyles, often triggered by processes that result in sedentarisation and urbanisation, involve loss of livelihoods and the displacement of local languages through substitution by national ones, eroding the conditions for a meaningful usage of indigenous and non-indigenous languages (Harrison, 2007) (see **Table 2.2**, Annex 2.8). These erosion processes take a toll on the transmission and formation of values (see 2.5), including those related to nature.

According to Beery *et al.* (2015), in less than two generations, people in most industrialised countries have become increasingly disconnected from a constant experience of non-human nature as a result of urbanisation, habitat loss, societal change, and lack of economic incentives, due to a drastically reduced workforce in agriculture, forestry, fisheries and other natural resource–based economic activities. One cannot name and fully know or value what one does not experience: language loss ultimately means the loss of knowledge and values about nature, which reciprocally sustain biodiversity and nature's contributions to people around the globe (Frainer *et al.*, 2020; Harrison, 2007; Pérez Báez *et al.*, 2019). Ultimately, this apparent disconnect and loss of access to nature is having an inter-generational effect on human understanding, values, attitudes, and actions, facilitating further destruction of humans and nature altogether (Beery *et al.*, 2015) (see 2.5).

30. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).

the post-2020 global biodiversity framework, the World Heritage Convention (WHC), the Universal Declaration on Cultural Diversity, the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the Ramsar Convention on Wetlands, and others (UNESCO & CBD, 2010). To address the fast-paced disappearance of human languages and, with them, ways of knowing and valuing the world, IPLC, governments, and other actors have undertaken actions to revitalise, safeguard, and support minority languages, from local community-led initiatives to global policies (Pérez Báez *et al.*, 2019; UNESCO, 2021). On February 28, 2020, participants from 50 countries, including government ministers, indigenous leaders, and other stakeholders and experts, adopted the *Los Pinos Declaration*, which establishes a Global Task Force for making 2022-2032 a Decade of Action for Indigenous Languages, placing indigenous peoples at the centre of its recommendations (UNESCO, 2021). Despite these efforts, there are many challenges, ranging from lack of funding and institutional support to political discourse and structural discrimination, that thwart local efforts to support living languages (see Bloch & Hirsch, 2017; Dockery & Duncan, 2020; Rousseau & Dargent, 2019). A knowledge and policy gap persists in coordinating efforts to articulate linguistic studies and language revitalization efforts into biodiversity studies, inventories, and management plans (Frainer *et al.*, 2020), as well as into valuation initiatives and decisions across scales (see **Box 2.15**).

2.2.3 Broad and specific values of nature and nature's contributions to people

Values are expressed by people, both individually and collectively (see **Box 2.9**). People conceive and express the ways they value nature and human-nature relationships differently. Sometimes, instead of being explicitly articulated, values are embodied in daily life actions, practices, rituals and choices, or in material culture. They are expressed implicitly (see Annex 2.10). In the following subsections, different types of environmental values and their relevance for policy are presented (see **Box 2.1**).

2.2.3.1 Broad values

Broad values – also called 'human values' (Rokeach, 1973), 'held values' (Brown, 1984), 'universal values' (Schwartz, 1994), 'principles' (IPBES, 2015) or 'transcendental values' (Kenter *et al.*, 2015; UK NEA, 2014) – refer to life goals and general guiding principles and orientations towards the world that are informed by people's worldviews (Dietz *et al.*, 2005). Although they originate in and arise from particular cultural settings, languages, and geographies, broad values go beyond singular contexts. Broad values include prosperity, freedom, recognition, health, belonging, livelihood, security, self-realisation, and justice, among others (see **Figure 2.10**). They influence specific values and provide them with a general background and meaning. For example, the Oromo of Ethiopia adhere

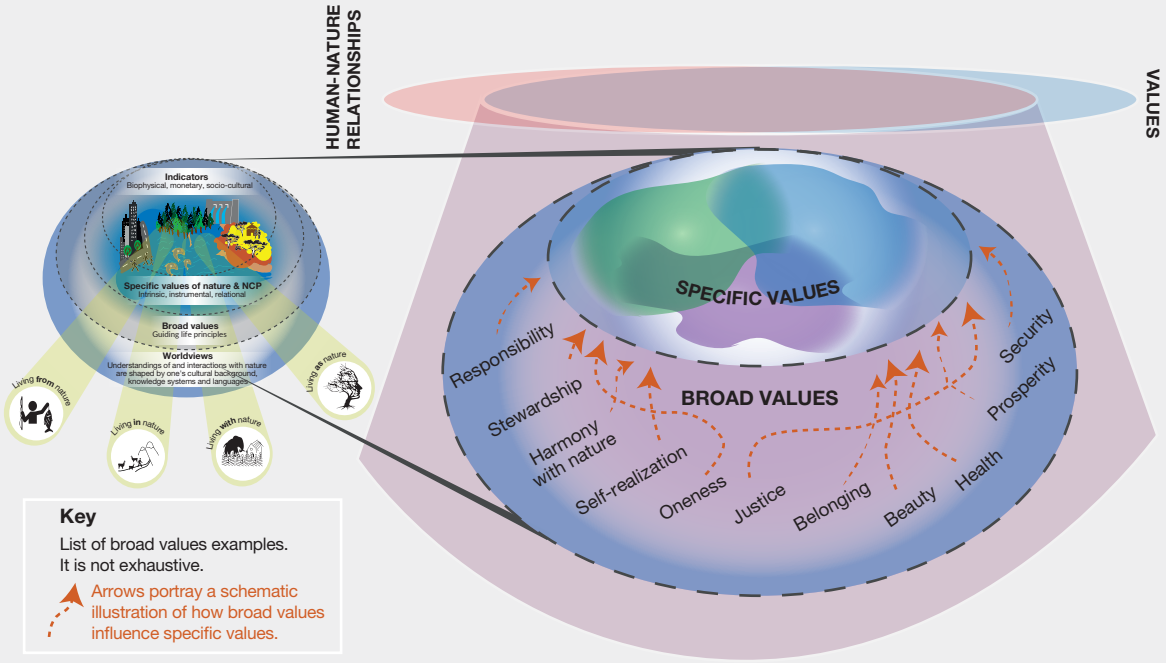

Figure 2 10 **Values of and about human-nature-relationships – broad values.**

Examples of broad values are presented that infuse and influence specific values and practices about human-nature-relationships. While broad values, such as justice, can apply to all aspects of life, the figure highlights those that are relevant for human-nature-relationships.

to the principle of *saffuu*, which guides people's lives and impels them to respect and do justice to one's own *ayyaana* (spirit) and that of other beings (Kelbessa, 2005). Because broad values are less context-specific and can be core components of human identity (Schwartz, 1992), they tend to be more stable over time (Anderson *et al.*, 2018; Bardi *et al.*, 2009; Piaget, 1952) and to only change when triggered by challenging events that affect multiple aspects of people's life, such as natural disasters, pandemics, or wars (Bardi *et al.*, 2014; Daniel *et al.*, 2012) (see 2.5, see **Box 2.14**).

Broad values can concern both human-human relationships and human-nature relationships. They play an essential role to justify extending ethical and moral concern to nature and to foster sustainability-aligned practices and policies. Different disciplines focus on different broad values. For example, environmental ethics highlights avoidance of suffering (Singer, 1975), freedom to pursue a life (Regan, 1983), harmony (Leopold, 2013), self-realisation (Naess, 1973), beauty (Hettinger, 2010), care (Warren, 2000), flourishing (Cuomo, 1998), and respect (Taylor, 1986). Economics emphasizes enhancing human welfare through efficient resource use (Mankiw & Taylor, 2014), whereas political ecology focuses on socio-environmental justice (Martínez-Alier, 2002). Research in relational worldviews highlights relational broad values like care, stewardship, identity, (Jax *et al.*, 2018; Ross *et al.*, 2018; Schröter *et al.*, 2020; West *et al.*, 2018), kinship responsibilities, and gratitude to other-than-humans (de la Cadena, 2015; Knudtson & Suzuki, 2006).

Broad values are seen as an important foundation to orient environmental action, guide policy, and motivate stakeholders and citizens towards environmental protection and sustainability (see 2.2.3.3). For example, the *Buen vivir* concept and analogous Philosophies of good living and collective well-being articulate relational worldviews and broad values that are linked with rights-of-nature discourses and policies (see **Box 2.4**; **Figure 2.10**).

Sustainability-aligned broad values concerning human-human relationships are key to pathways of transformation towards more sustainable futures (see Chapter 5), by fostering, for example, a shift from individualism, materialism, and economic profit to other principles like care, unity, equity, reciprocity, and justice, which underpin visions of more just and sustainable outcomes (e.g., Ateljevic, 2013; Horlings, 2015; McPhearson *et al.*, 2021; Ripple *et al.*, 2019) (see **Box 2.4**, see 2.3.2.3, Chapter 5). Justice provides an important example of how a broad value concerning chiefly human-human relationships illuminates specific values of/about nature and can guide sustainability-aligned policy and practices. Justice rooted in the idea of *"universal respect for human rights and human dignity"* (United Nations, 2015) is widely recognised and operationalised (e.g., in the United Nations Declaration of Human Rights) and mentioned as a central goal in major international environmental fora (e.g., the Declaration of the Rio Summit on Sustainable Development in 1992, the Sustainable Development Goals in 2015, see 5.1.2.2)

and in ILK literature[31] (see 2.2.1). In environmental policy documents and scholarly literature, justice as a broad value entails different dimensions, such as the fair distribution of benefits (including nature's contributions to people) and burdens across current living generations (distributional justice) and to future generations (intergenerational justice and sustainability); the fair inclusion in decision-making processes (procedural justice); the fair recognition of diverse values, identities, and knowledge in their own terms (recognition justice) (see Annex 5.4). Justice as a broad value refers also to human-nature relationships or nature as subject of rights (ecological justice) (Lamberti, 2019; Yaka, 2019).

31. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).

Box 2 4 Philosophies of good living in policy and practice from around the world.

The Spanish-language notion of *Buen vivir* (good living in English) is rooted in indigenous Andean worldviews and languages (*Sumak Kawsay* in Kichwa, and *Suma Qamaña* in Aymara) in South America and conceptualizes a good quality of life through broad values that guide human-human and human-nature interconnections (Albó, 2018). It proposes alternatives to defining a well-being, based not on a single metric or at the individual level (Gudynas, 2011), but rather promoting collective good quality of life, where all life forms are seen as parts of a symbiotic whole (Huambachano, 2018, 2020; Shebell & Moser, 2019). Despite its origins in South America, analogous concepts and associated values are widespread among IPLC and other sociocultural groups throughout the world, as revealed from the literature (n=204 academic articles) and this cross-assessment case-study[32].

For example, *Mino-bimaatisiwin* (living a good life/balanced life) is a basic principle among Anishinaabe people in North America[33], which informs a set of principles and protocols in human actions that are manifested not only in offerings, reverence, non-greed, and non-waste, but are used to make decisions affecting community landscapes (Borrows, 2016; LaDuke, 1994). Similarly, in sub-Saharan Africa, the relational values system of the *Ubuntu* philosophy focuses on reciprocity, dialogue, and collective humanity, which are extended to nature and have been applied in development, external relations, educational and health practices (Chibvongodze, 2016; Eze, 2019; Le Grange, 2012; Lefa, 2015; Qobo & Nyathi, 2016).

Notwithstanding important local specificities (Heikkilä, 2016), throughout the world philosophies of good living generally promote and embody diverse values and principles existing between humans and between humans and nature (see **Figure 2.11**). Many of these values are broad, and include, for instance, reciprocity, harmony, respect, solidarity, responsibility, place-based identities, kinship with nature, and economic self-determination (Albó, 2018; Huambachano, 2018; Whyte, 2020). Non-IPLC languages and knowledge systems from other world regions also include comparable terms, such as the Italian concept for *la dolce vita* and the Polish/Russian concept of a good life *dobrobyt/dobrobytach/благосостояние*. In Bhutan, the gross national happiness index is based on a holistic approach to well-being that includes several criteria, such as psychological well-being, community vitality, environment diversity, and culture, which align with some of the values shared by other Philosophies of good living (van Norren, 2020).

Philosophies of good living of indigenous peoples and local communities usually contrast with conventional economic indicators of a good quality of life, since it is not conceived at the individual level (Gudynas, 2011). Rather, it is necessary to consider the community and its relationship with nature, requiring new platforms for thinking, practicing, and experiencing alternative futures based on biocultural ethics (Nemogá, 2019; see 5.5.4). For example, in New Zealand, Maori relational values of good living were found to guide instrumental values in decision-making related to business and economic activities (Härtel, 2015). Values underpinning these philosophies have been implemented in practices and policies from local to global scales (see 3.2.4), although with various levels of success and criticism (see 4.4). Locally, collective good quality of life principles have been adopted in territorial management plans, agricultural practices, and customary laws among indigenous peoples and local communities and other groups across the world (Baniwa, 2019; Quiceno Toro, 2016). Values associated with the *Buen vivir* concept have been institutionalised in the Ecuadorian and Bolivian constitutions and in other national and international policies (Quick & Spartz, 2018), albeit with significant differences from the original indigenous understanding (Cuestas-Caza, 2018; Valladares Pasquel, 2019; Waldmüller, 2014). These philosophies also have been represented and expressed in scholarly work, social movements, and intercultural educational policies (Rojas Martínez, 2005; see 5.5.4), and inspired global rights-of-nature policies protecting rivers, forests, and species (Acosta & Martinez, 2011; Gudynas & Acosta, 2011). Under the aegis of the United Nations, the Harmony with Nature initiative encapsulates ideas and values in line with those of the Philosophies of Good Living. In 2009, the UN General Assembly also proclaimed April 22 as 'International Mother Earth Day' and adopted its first resolution on Harmony with Nature. Member states recognized that it is necessary to promote the broad value of harmony with nature to achieve a just balance among the economic, social and environmental needs of present and future generations.

32. Literature review for the philosophies of good living (https://doi.org/10.5281/zenodo.4399544).
33. The concept of mino-pimatisiwin is also prevalent for the Cree/Inninuwag people.

Box 2 4

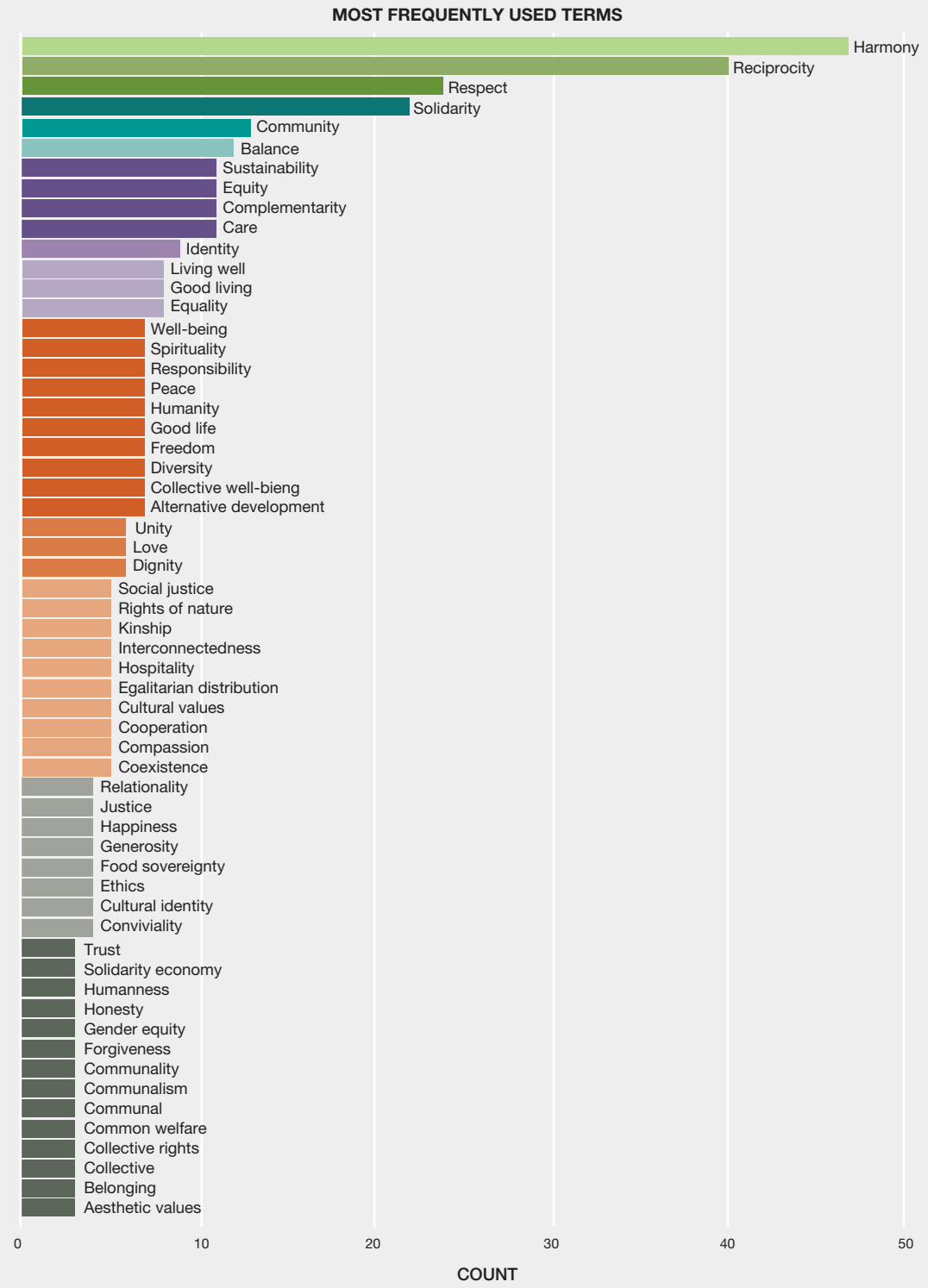

Figure 2 11 **Topics and values associated with Philosophies of good living from around the world.**

The chart shows the frequency of which these terms occurred in the Philosophies of good living literature review (n=204

academic articles)[34]. These terms express values connected to the concepts of good living, collective well-being or good quality of life rooted in the worldviews of indigenous peoples, local communities and other social groups.

34. Literature review for the philosophies of good living (https://doi.org/10.5281/zenodo.4399544).

Justice is relevant to policy and decision-making in various ways (see Annex 5.4). For example, in the global marine fisheries literature (see Annex 2.11), justice was found to be relevant for both industrial fishing and small-scale fisheries, but also within and among multiple governance scales: from households (Fröcklin *et al.*, 2013) to transboundary scales (Hanich *et al.*, 2015). (In)justice is a cross-cutting issue that affects multiple socio-ecological dimensions and determines power structures that condition trajectories of resource use and human well-being (see 2.4).

2.2.3.2 Specific values categorized as intrinsic, instrumental and relational values

Specific values are opinions or judgements of the importance of specific things in particular situations and contexts (e.g., the importance of water quality) or states of affairs (e.g., the importance of enacting water quality regulations; see **Figure 2.12**). They have also been referred to as 'assigned' (Rokeach, 1973) or 'contextual' values (Kenter *et al.*, 2015; UK NEA, 2014), or simply 'importance' (IPBES, 2015).

With respect to specific values, a literature review[35] of intrinsic, instrumental, and relational values, the value types that align with the conceptualisation in the IPBES *global assessment* (IPBES, 2019d; Pascual *et al.*, 2017) was conducted (see details in Annex 2.10). Before 2016, intrinsic and instrumental values were the predominant categories in scholarly research. While other categories exist (see **Box 2.5**), these value types correspond respectively to the importance of biodiversity for its own sake, regardless of usefulness to people (Klain *et al.*, 2017; Shanee, 2013), and the importance of nature as a resource for humans (Raymond *et al.*, 2013; Reyers *et al.*, 2012; van der Ploeg *et al.*, 2011). Relational values emerged later to address the importance of non-instrumental human-nature relationships. The definitions below refer to the core

35. Systematic review of value types (https://doi.org/10.5281/zenodo.4396289).

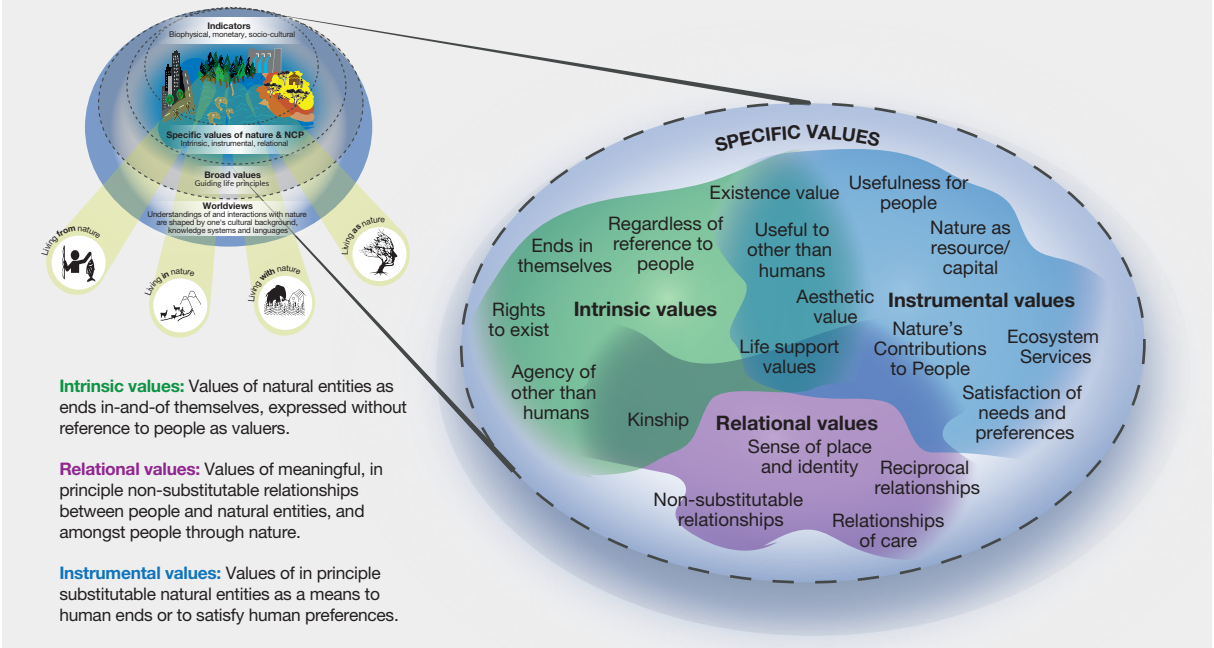

Figure 2 12 **General visualization of nature's multiple specific values.**
Core definitions, examples and fuzzy boundaries are displayed for each value type.

Box 2.5 Life-support values.

A gap emerged in the literature review regarding an overlapping dimension of value that spans across the three predominant specific values categories. This transversal dimension refers to the way people express the value of life-supporting processes, functions, and systems – interrelating biophysical, spiritual, or symbolic aspects – and relationships of dependence and interdependence with respect to them. It is largely described as non-substitutable and foundational for the articulation of other environmental values and can be linked to specific values associated with the diverse understandings of nature in IPBES-4/1. This dimension, called here life-support values, is associated with:

- Intrinsic values related to the importance of evolutionary and ecological processes that are independent of people's judgments (Hattingh, 2014; IPBES, 2019d; Kahn Jr., 1997; Rolston, 1993; Shanee, 2013), but enable other values to arise (Rolston, 1988);
- Instrumental values related to the importance of supporting ecosystem services (MEA, 2005; Rolston, 1993), functional values (Lockwood, 1999), indirect use values (Hansjürgens, 2014; Kumar, 2011), critical natural capital (DesRoches, 2019), and regulating nature's contributions to people (Díaz *et al.*, 2015) that stress the indirect function of supporting other ecosystem services or nature's contributions to people;
- Relational values referring to the importance of life-supporting processes that give sense to people's existence and identity (Arias-Arévalo *et al.*, 2018; Muraca, 2011, 2016; Schröter *et al.*, 2020).

The latter also includes the spiritual and symbolic meaning of life-giving and life-regenerating processes in specific contexts (including contextual nature's contributions to people), as expressed in the Andean indigenous concept of *Pachamama*, referring to earth's generative powers and to the very constitution of life (Macas, 2010; Pacari, 2009; Silverblatt, 1987; Tola, 2018) or contextual spiritual foundations for the regeneration of life, practices, and reciprocal relations as in the meaning for the Dongria people of the Niyamgiri Mountains of India, which *"not only provide the people with life and livelihoods, they are also worshipped as the upholders of the Earth and the laws of the Universe"* (Supreme Court of India, 1995) (see **Box 2.12**).

meaning identified in the literature review and their policy relevance (see **Table 2.3**).

Intrinsic values refer to the value of other-than-human beings expressed independently of any reference to humans as valuers (Bremer *et al.*, 2018; Christie *et al.*, 2019; Devos *et al.*, 2019; Hovardas, 2013; Pearson, 2016). This definition includes entities that are worth protecting as ends in-and-of themselves; it is consistent with biocentric worldviews and with the understanding of values as existing objectively in nature (Batavia & Nelson, 2017; Himes & Muraca, 2018; Piccolo, 2017; Regan, 1986; Rolston, 1994; Taylor, 1986; van der Ploeg *et al.*, 2011) (see 2.2.1). Intrinsic values are considered essential to sustain and trigger people's motivation for conservation (Batavia & Nelson, 2017; Polasky *et al.*, 2012), in education (Zhang *et al.*, 2013), and to articulate the agency of other-than-human beings (e.g., Quechua communities in Perú consider Ausangate Mountain as a powerful earth-being) (de la Cadena, 2010). Appealing to intrinsic values can help legitimise environmental protections and improve policy success (O'Connor & Kenter, 2019). Despite intrinsic values being essential to conservation success, they are not always incorporated in environmental management (Minteer *et al.*, 2004). For example, local fishers in England reported important intrinsic values connected to marine biodiversity, which have not fully been incorporated in governmental management plans and policies for marine governance (Anbleyth-Evans & Lacy, 2019) (see **Box 2.8**). Intrinsic values can be expressed using biophysical indicators (Pascual *et al.*, 2017), while social assessment of intrinsic value requires mostly qualitative and participatory methods (O'Connor & Kenter, 2019) (see Chapter 3).

Instrumental values refer to things and processes that are important as a means to some human end or to satisfy human preferences (Pascual *et al.*, 2017) and *"include economic values, regardless of whether the entity is directly or indirectly used, or not used"* (IPBES, 2019d, p. 30). Nature is important insofar as it provides (potential) utility to humans (Chan *et al.*, 2016; Eser *et al.*, 2014; Weston, 1985) and supports human economic well-being and subsistence (Lau *et al.*, 2019; Oba *et al.*, 2008; Pfund *et al.*, 2011). Instrumental values can help express the importance for IPLC to access and use nature (e.g., wild food plants or wild animals, Ghorbani *et al.*, 2012), but also the need for protecting it (e.g., as with the protection of crops from elephants in the Congo Basin, Ngouhouo Poufoun *et al.*, 2016). Because instrumental values refer to a means-to-an-end, the means might be substitutable at least in principle, even if not always in practice (Callicott, 2009) (see **Box 2.6**).

Among specific values, instrumental values are the ones that lend themselves best to different types of economic valuation, cost-benefit analysis of ecosystem services, and nature's material (and some regulating and non-material) contributions to people. They are conceptually and technically easier to quantify than other value types. Because they are deemed substitutable in principle, albeit not always in practice, they support high comparability and

commensurability, which facilitates trade-off assessments that can be articulated in monetary units. However, purely instrumental approaches to valuation may obscure other value expressions, lead to crowding out other reasons and motivations for environmental protection (Rico García-Amado *et al.*, 2013), alienate stakeholders (De Vreese *et al.*, 2019), and misrepresent conflicts (Hattingh, 2014).

Relational values refer to the importance of desirable, meaningful, and often reciprocal human relationships – beyond means to an end – with nature and among people through nature (Chan *et al.*, 2016, 2018; De Vos *et al.*, 2018; Himes & Muraca, 2018; Schröter *et al.*, 2020) and their significance to a good quality of life (IPBES, 2019d, p. 30). They are often framed as context-dependent, non-transferable, non-tradable, and therefore largely non-substitutable (Kenter *et al.*, 2019). Relational values highlight relationships with nature that constitute people's individual and collective identity, as expressed for example in the Japanese concept of *fūdo*, referring to interrelationships between people and local characteristics (De Vos *et al.*, 2018; James, 2020; May Jr, 2017), deeply rooted sense of place (Marshall *et al.*, 2019; Mrotek *et al.*, 2019; Norgaard *et al.*, 2017), spiritual meaning (Saner & Bordt, 2016), and community cohesion. For example, in New Zealand, an agreement between the Whanganui Iwi (Maori) people and the Crown acknowledged that the Te Awa Tupua River is connected with the Iwi and Hapu peoples' identity in an inalienable way; the document literally says *"I am the River and the River is me"* (Te Awa Tupua Whanganui River Claims Settlement Bill 2016). Relational values also include people and nature interactions that are essential components of a

Table 2 3 **Summary of literature review findings about intrinsic, instrumental, and relational values.**

Bold text is used to highlight key issues or themes (see details in Annex 2.10).

Value type	Core definition	Salient meanings summarised from the literature	Most mentioned associations with worldviews & broad values
Intrinsic	• Values associated with entities worth protecting as ends in-and-of themselves. • Values of entities expressed independently of any reference to people as valuers.	• **Non-instrumental** value • Value of something that is an **end-in-itself** • Value **independent of being valued** or recognised by (human) valuer as inherent properties of other-than-human beings • Regardless of **importance** and/or **usefulness** to people • **Inherent moral value** of natural beings **(right to exist)**	• Strongly and explicitly associated with **non-anthropocentric, biocentric or ecocentric worldviews** • Strongly associated with **moral obligations** towards other living things or life in general • Weakly associated with biospheric and altruistic values & with spirituality
Instrumental	• Values associated with living and non-living entities, as means to achieve human ends or satisfy human preferences. As means to an end, instrumental values are in principle replaceable, albeit not always in practice.	• **Means to an end,** mostly in terms of usefulness, utility or benefits for humans; sometimes also for other-than-human beings • Leading to **satisfaction** of needs, preferences, interests and desires • Strongly associated with **nature as resource, ecosystem services, capital, asset or property**	• Strongly and explicitly associated with **anthropocentrism** • Strongly and explicitly associated with **utilitarianism** & managerialism
Relational	• Value of desirable, meaningful, and often reciprocal human relationships with nature, which are often specified as a particular landscape, place, species, forest etc., and among people through nature. In principle non-substitutable.	• Values of or deriving from **desirable, meaningful, just & reciprocal relationships with "nature" and/or among people through nature** • Values relative to or deriving from **relationships that are constituent parts of** cultural, individual, collective or communal **identity** • Values relative to or deriving from relationships that are constituent elements **for living a good life (i.e. eudemonic)** • Values associated with **care for/about** specific landscapes, places, human & other-than-human others • Values associated with **sense of place**, interconnection of cultural & sacred landscapes • Value of nature as a point of **connection among people,** binding communities together & supporting social networks, such as in traditional markets	• Strongly associated with relational, **pluricentric** or non-centric worldviews that question strict separation between nature and culture/society/humanity and stress interdependence among all beings • Strongly and explicitly associated with broad values, such as **stewardship, responsibility, care, affection, reciprocity, harmony with nature, good life & justice** • Associated with **cultural ecosystem services,** as well as with **spirituality**

meaningful, dignified, and flourishing life (i.e., 'eudaimonia') (Carretero *et al.*, 2018; Klain *et al.*, 2017; Nussbaum, 2011; Saxena *et al.*, 2018; Sayer, 2011), such as mental and emotional health, virtues and attitudes of care and responsibility towards other people and other-than-human beings (Chan *et al.*, 2016; De Vreese *et al.*, 2019; IPBES, 2018a; Jax *et al.*, 2018; Krebs, 1997; Lenzi, 2017; Maass, 2005; Ott, 2016; Pradhan, 2018; van den Born *et al.*, 2018; Whyte, 2016); (see **Box 2.4**).

In policymaking, relational values can help articulate the idea that a specific place, a forest, a river, a landscape, or a population are essentially important to people (individuals or communities) because of the unique relationships, history,

Box 2 6 Values and preferences in environmental economics.

Preferences express a widespread understanding of value in economics and social science methods, such as multi-criteria analysis (Raymond & Kenter, 2016) (see Chapter 3). Preferences refer to subjective rankings between choice alternatives (Engelen, 2017; Hausman, 2005, 2012) and allow values to be prioritized and compared. The focus on preferences in environmental economics is mostly anthropocentric and instrumental, where value is assigned to biodiversity or ecosystem services *"to the extent that these fulfil needs or confer satisfaction to humans either directly or indirectly"* (Kumar, 2011, p. 187).

Preference-based approaches are useful to assess the relative importance of given scenarios through choice (e.g., the allocation of money or time for a particular purpose). Yet to be expressed in terms of preferences, values must be framed as directly comparable or commensurable, which means that they are often translated into quantitative terms to facilitate trade-offs among them (TEEB, 2010b).

The total economic value (TEV) is an established environmental economics value classification framework designed to include a wider range of values associated with benefits (or detriments) of the environment (see **Figure 2.13**). The TEV approach distinguishes among use values, based on the satisfaction generated by direct use (consumptive or non-consumptive) of natural resources or by indirect use (the conditions that enable use and satisfaction), non-use values, and option value (generated by future use). Non-use values refer to the utility or satisfaction generated for an individual by knowing that others will have access to nature's benefits, be it other people currently living (altruist value) or future generations (bequest value), or by knowing that something exists, even if there is no direct access to or direct enjoyment of it (existence value). In environmental economic language, the term altruism refers to individual preferences (i.e., individual satisfaction gained by knowing that other people might enjoy nature's benefits or that other than human beings exist).

TEV highlights the dependence of societal and economic development on ecosystems. It is helpful in providing a common metric to assess and estimate a wide range of instrumental values, which, if they are substitutable, can be ranked in terms of preferences and expressed in terms of means to an end (Kumar, 2011). By expanding the perspective to future generations, future use and others' preferences it can dialogue with weak anthropocentrism (see 2.2.1) and build bridges in practice with biocentric or ecocentric solutions, albeit using a language rooted in individual satisfaction and the assumption of trade-offs and comparability. The TEV framing is based on a broad understanding of economic values that goes beyond use of monetary indicators (Hansjürgens, 2014) and, when applied according to TEEB criteria (TEEB, 2010b) (see 1.1.2), it can provide policymakers with a helpful instrument to find agreement or convergence points among diverse stakeholders regarding instrumental values of nature.

Although the total economic value is most adequate to capture instrumental values, other value types sometimes can be indirectly identified by framing them in the language of preferences (see **Figure 2.13**). When legitimate, a proxy can help identify that a preference for a value is present but cannot estimate the strength of that preference compared to others. For example, to frame intrinsic values in terms of direct, non-consumptive use-values or as individual preferences is a great challenge for valuation because they typically represent something that cannot be ranked and is neither negotiable nor substitutable, as is the case with nature's sacred values (Dasgupta, 2021; Kumar, 2011; see 3.2.2.4, 3.3.1.2). Although existence value can be used as an indicator to represent intrinsic or spiritual values, it fails to capture their full meaning. Environmental conflicts often arise when people implicitly or explicitly reject the reduction of values to preferences and refuse to negotiate trade-offs or compensations for their loss (e.g., environmental conflict in the sacred Niyamgiri Mountains of India, see **Box 2.12**). Similarly, the value of biotic and abiotic components of functionally reliable and self-organizing ecosystems cannot be captured adequately by the total economic value; these value types *"are not ascertainable via individual preferences of human beings and therefore they cannot be assessed monetarily on the basis of certain economic methods of evaluation"* (Hansjürgens, 2014, p. 79). In these cases, non-economic indicators can replace or complement the total economic value (see 2.2.4) to better address environmental conflicts, and to support epistemic and recognition justice.

Capturing values through an utilitarian approach (Keat, 1997), can be useful in many situations, but problematic in cases (Braat, 2018; Costanza *et al.*, 2017; Kenter, 2018), in which highly complex socio-ecological systems with multiple ecosystems and services or deeply-rooted ethical or cultural values, or when multiple knowledge and value systems, including ILK, are involved (Gómez-Baggethun *et al.*, 2010) (see **Figure 2.13**, **Figure 2.14**, Annex 2.12).

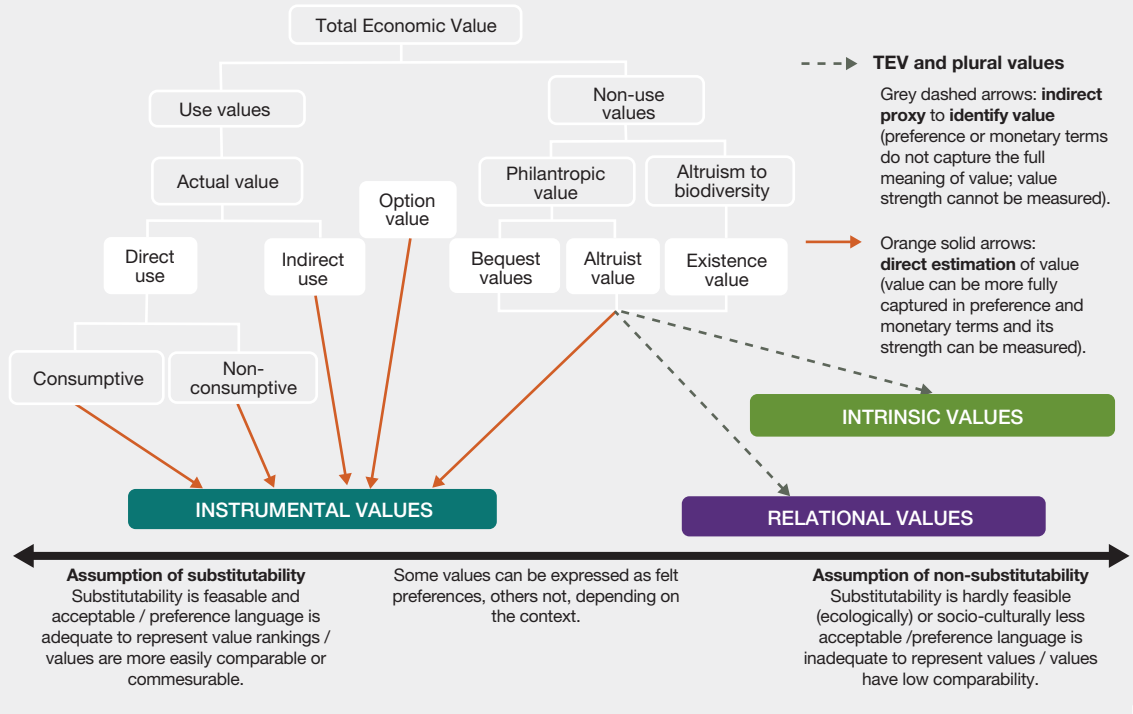

Figure 2 13 **The total economic value classification framework encompasses multiple environmental value types.**

The figure presents a spectrum between stronger and weaker assumptions of substitutability between the objects of value. The red arrows refer to values that can be estimated directly by applying the total economic value categories. The blue dashed lines refer to a possible, indirect use of the total economic value categories as proxies to identify values whose full meaning and strength cannot normally be assessed by preference-based or monetary approaches. In such cases, the total economic value can be replaced or complemented by other frameworks.

and traditions that bind them together (Kothari & Bajpai, 2017). According to academic literature, relational values can benefit policies directly by accounting for contextual nature's contributions to people (Díaz *et al.*, 2018b) and help operationalise broad policy guidance from local to national scales (Kitheka *et al.*, 2019). Relational values can catalyse motivation and appeal to a broader audience (Stenseke, 2018; Uehara *et al.*, 2020; Winkler & Hauck, 2019), particularly for IPLCs (Gould *et al.*, 2019; Himes & Muraca, 2018), and increase participation of different stakeholders (Jax *et al.*, 2018; Kitheka *et al.*, 2019). By stressing reciprocal relationships tied to responsibilities, they can facilitate justice, social equity and sustainability (Diver *et al.*, 2019; Whyte, 2020).

2.2.3.3 Policy relevance of considering diverse value types and their overlaps

Despite their distinct definitions, instrumental, intrinsic, and relational value types are not mutually exclusive and instead often overlap (see **Figure 2.12**) (Himes & Muraca, 2018; Pascual *et al.*, 2017; Schröter *et al.*, 2020). For example, food may simultaneously have instrumental and relational values, depending on the meaning and local practices that govern interactions with it (Lau *et al.*, 2019; Whyte, 2018a, 2018b, 2018c). Rather than presenting a problem, this convergence can be used by policymakers to build common understanding across stakeholders in support of conservation or equitable development (Berry *et al.*, 2018; Norton & Steinemann, 2001; Saner & Bordt, 2016). For example, agricultural policies can also consider the complex ways farmers and pastoralists identify with landscapes, including values linked to place identity or duties of care and responsibilities towards the land (Allen *et al.*, 2018), which can help design more successful productive programs that also reduce conflicts between conservationists and farmers by supporting multi-stakeholder participation in conservation incentive programs (Chapman *et al.*, 2020).

A review of national biodiversity strategies and action plans reveals that there is still less reference to relational or intrinsic values than instrumental ones and, when present, these tend to occur in aspirational or agenda-setting contexts (see Annex 2.2). Assessing diverse values can help policymakers

make otherwise neglected, intangible costs and benefits visible (Witt *et al.*, 2019), facilitate a more inclusive and just articulation of values (Himes & Muraca, 2018), clarify, reduce or avoid conflicts by fostering co-management (García-Llorente *et al.*, 2018) and participation among different stakeholders (Arias-Arévalo *et al.*, 2017; Berry *et al.*, 2018; Gale & Ednie, 2019; Reed & Ceno, 2015), increase the acceptability of environmental interventions through better communication (Hope & Jones, 2014; Witt *et al.*, 2019), and enable a more comprehensive and representative evaluation of why people value nature, nature's contributions to people and human-nature relationships. More pluralistic approaches help build common ground and reciprocal learning across different stakeholders by acknowledging different reasons and motivations (Rico García-Amado *et al.*, 2013).

Despite its relevance to policymaking, approaches that aim at considering diverse values can be more complex and require more resources (see **Figure 2.14**). It may also require institutional capacity-building, given the complexities associated with comparing values (see **Box 2.15**). Some values are directly comparable and thus rankable (Kenter, 2017; Kronenberg & Andersson, 2019) by adopting the same indicator (e.g., monetary metrics in willingness-to-pay surveys, Pouta *et al.*, 2000); or time metrics in willingness-to-give-up-time surveys (García-Llorente *et al.*, 2016). In other cases, values are only compatible because they cannot be measured by the same metrics, but it is possible to technically join the underlying data (e.g., if they denote a similar relational aspect like geographical coordinates or resolution) or to compare them indirectly through practical judgement and deliberation (e.g., multi-criteria analysis or deliberative processes that form shared values) (Martinez-Alier *et al.*, 1998; Orchard-Webb *et al.*, 2016; Ranger *et al.*, 2016; Zografos & Howarth, 2010) (see 2.4.2, **Box 2.9**). There are also cases in which different value types are neither directly comparable nor compatible and must be considered in-parallel by decision-making. For example, the relational value of Niyamgiri Mountain is sacred for the local community; cost-benefit analyses cannot adequately represent this value because it cannot be ranked, compared nor negotiated with other value types like the economic benefits deriving from bauxite mining. In such cases, assessing diverse, parallel values might be crucial to obtain a more comprehensive picture of the situation and to guide policy interventions that are better informed and aware of potential lines of conflict (Munda, 2004). Sometimes diverse, parallel value and knowledge systems can communicate through braiding (Kimmerer, 2013; Tengö *et al.*, 2014, 2017; Whyte, 2020).

Key situations where the assessment of diverse values is likely to lead to more robust decisions include highly complex, uncertain or contested decision-making contexts, including diverse stakeholders (Frame & O' Connor, 2011) (see **Figure 2.14**). Approaches that draw on a single indicator are likely to be effective in low complexity situations with limited stakeholder divergence (Kenter *et al.*, 2014; UK NEA, 2014).

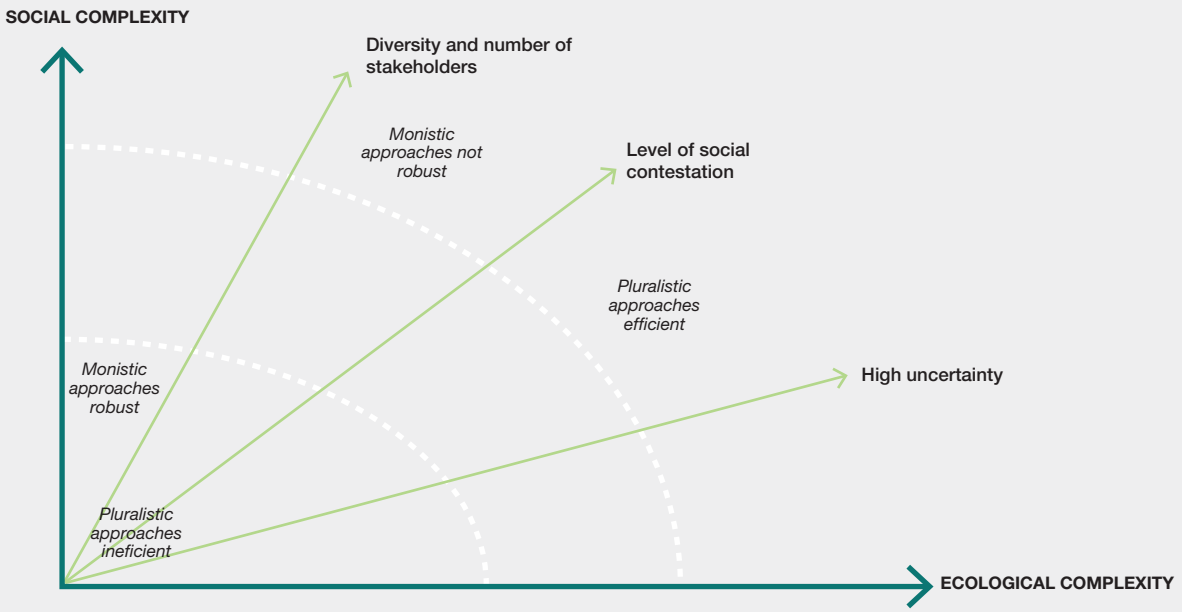

Figure 2 14 **Key factors influencing the relative robustness and efficiency of more monistic and more pluralistic approaches.**

Figure based on Frame & O' Connor, 2011; Kenter *et al.*, 2014; UK NEA, 2014.

2.2.4 Values as indicators

Value can also refer to value indicators or measures to operationalize valuation methods (see Chapter 3). Indicators refer to the quantitative or qualitative dimensions that help directly or indirectly assess the values people articulate (i.e., in writing or orally) or manifest (i.e., actions or behaviour). Some indicators are more suitable to identify diverse values, while others elicit a single set of value types. Indicators encompass *biophysical, socio-cultural and economic* aspects, as well as a combination or integration of these (see 3.2.2.4, 3.3.1.2). Notably, these types of indicators do not map directly onto specific values. As such, it is possible to have socio-cultural indicators for intrinsic values, or biophysical indicators for instrumental values. Other types of indicators are applied at a larger societal scale and are termed macro-indicators (see **Box 2.7**).

Biophysical indicators encompass measurements of ecosystem stocks and flows (organisms, material, energy) and include genetic diversity; number of rare or threatened species of fauna, fungi, bacteria, and protists; structural and functional connectivity of habitat; proportion of population exposed to air pollution. Biodiversity may be treated in nature's contributions to people through the *maintenance of options* to demonstrate the importance of biodiversity as variety and as aspects of ecological integrity and resilience (Faith, 2018). **Socio-cultural indicators** can be quantitative (e.g., photo rankings, spatial densities of relational values in an area) and qualitative (e.g., ethnographic accounts, themes in a text representing nature's values). **Monetary indicators** are preference-based and may assess subjective preferences through methods like contingent valuation, choice experiments, or hedonic pricing. They can refer to flows (benefits derived from healthy ecosystems and to costs caused by their depletion) and stock values of natural capital (Jones *et al.*, 2016).

Both socio-cultural and economic value indicators can also be assessed through deliberation (e.g., participatory multi-criteria analysis, deliberative monetary valuation, or citizens juries) (see **Box 2.9**; see Chapter 3 and Chapter 4). Furthermore, indicators can be aggregated into macro-indicators or combined into indicator sets or dashboards.

Box 2 7 Gross domestic product (GDP) as a macroeconomic indicator.

Gross domestic product (GDP) is the most prominent example of an aggregated macro-indicator. It measures the market value of goods and services produced by a national economy and is used to indicate and compare the size of the economy within and between countries, and how the size evolves over time. However, GDP has many, widely recognised limitations; leading economists have called for the development of alternative indicators to better measure human well-being and social progress (e.g., Stiglitz *et al.*, 2009; Dasgupta 2021). In particular, GDP does not reflect the values of nature, many of which are unpriced and outside of market evaluation. It is well established that economic growth contributes to the deterioration of nature and this growth is often measured by GDP (IPBES, 2019d). A recent synthesis found that economic growth strategies are predominant in national biodiversity strategy documents, despite an absence of evidence that growth in gross domestic product is correlated with improved biodiversity outcomes (Otero *et al.*, 2020). Instead, gross domestic product growth is correlated with biodiversity declines, thereby invalidating the hypothesis of automatically improved environmental outcomes at higher levels of growth (known as the environmental Kuznets curve). According to the Dasgupta review (2021), standard macroeconomic approaches focused upon GDP growth have radically undervalued nature's importance for human well-being, given the absence of effective pricing or market signals for many ecosystem services. Moreover, as gross domestic product reflects an instrumental view, nature's value is largely reduced to the source of raw materials needed to produce goods and services, which are themselves of instrumental value for an improved standard of living (used as a proxy for well-being). As such, even if current environmental externalities were internalized through more effective pricing mechanisms, gross domestic product would still not measure the diversity of nature's values or non-instrumental worldviews, or human-nature relationships presented above.

Alternatives to GDP have been developed (e.g., Index of Sustainable Economic Welfare, Daly, 1992), United Nations System of Environmental Economic Accounting (UN SEEA, 2012), that enable different types of nature's contributions to people to be expressed in monetary (and sometimes non-monetary) terms so that these contributions can be compared to other goods and services. These alternatives can be adapted to countries' priorities and policy needs, while at the same time providing a set of common concepts. The Dasgupta review also proposes the alternative indicator of 'inclusive wealth', which measures the social worth of an economy's total stock of capital goods, comprising produced, natural, and human capital (Dasgupta, 2021). Unlike gross domestic product, which only attends to flows of marketed ecosystem services, inclusive wealth implies an asset management perspective on natural capital, while recognising that much of this natural capital is non-substitutable for other capital stocks, but complementary to them and indispensable for economic or human activity.

These alternatives address some of the issues of gross domestic product, including providing assessments of natures' values that take account of human and social capital. Nonetheless, important concerns remain, including how to account for values that are non-substitutable or how to represent the dynamic and often highly contextual relationships between people and nature.

Examples of aggregated macro-indicators include gross domestic product (GDP), the index of sustainable economic welfare (ISEW), the genuine progress indicator (GPI) or the Sustainable Development Goals index (Cobb *et al.*, 1995; Daly & Cobb, 1994; Sachs *et al.*, 2021). The newly developed planetary pressures adjusted human development index and dashboard, and the sustainable well-being index (SWI), aligned with the SDGs, both offer an aggregated index and a dashboard for disentangling specific dimensions of well-being (Fioramonti *et al.*, 2019). Macro-indicators can refer to specific aspects and assess them on a global scale for biophysical dimensions (e.g., ecological footprint or human appropriation of net primary production) or combine different aspects of biophysical and economic data as part of national accounting (e.g., System of Environmental-Economic Accounting) (see Chapter 4).

Based on the above information, it has been shown that (a) a spectrum of value types exists, and (b) these values can be organized to support environmental policy in different contexts. The next section covers the topic of values-organization frameworks. While no single overarching organization framework captures diverse values in their entirety, understanding their conceptual and practical abilities and limitations allows decision-makers to capture alternative and/or incompatible understandings of nature's values across cultures and contexts.

2.3 ORGANIZING THE DIVERSE VALUES OF NATURE

2.3.1 Values-organization frameworks

A review of 284 academic articles[36] identified diverse values organization frameworks (see Annex 2.10). No framework was generally accepted across disciplines. The most widely referenced was ecosystem services (41% of articles), referring to both its use and criticisms. A common critique regards its anthropocentric, instrumental discourse, which can oversimplify ecological functioning to suit a market framing (Kosoy & Corbera, 2010; Norgaard, 2010) and overlook intrinsic values key to successful conservation outcomes (Batavia & Nelson, 2017; Taylor *et al.*, 2020). However, others argue that ecosystem services can capture more diverse values and broaden scope for policy consensus than intrinsic value-based paradigms (Schröter & van Oudenhoven, 2016). Ecosystem services' limitations in fully engaging broader social sciences, the humanities, and IPLC perspectives was an important motivation for IPBES' nature's contributions to people framework (Díaz *et al.*, 2018a). While nature's contributions to people explicitly considers relational values, it still uses an anthropocentric framing, and its ability to address some of ecosystem services' limitations is debatable (Kadykalo *et al.*, 2019; Kenter, 2018; Köhler *et al.*, 2019).

A review of 150 ILK documents[37] found a substantially different emphasis on human-nature relationships. Only 8.5% referred to ecosystem services. Biocultural approaches were most common (25%). There was an overall diversity indicating the absence of any overarching framework.

In 49 policy documents[38] again no single framework dominated, with human-nature relationships and underlying worldviews typically implicit. Most documents (44.9%) reflected anthropocentric worldviews. Few expressed pluricentric and relational (14.3%) or ecocentric worldviews (10.2%). Most policy documents did not explicitly discuss value concepts (53.1%), but many emphasized mixed valuation methods, including biophysical, economic, and socio-cultural indicators (42.9%). Also, there were few explicit references to relational or intrinsic values, or nature's contributions to people, and these tended to occur in agenda-setting contexts.

Overall, there was an absence of frameworks attending to both broad and specific values around diverse human-nature relationships across knowledge traditions. Reflecting different epistemic worldviews, frameworks were not easily comparable; each provides insights on certain human-nature relationships while obscuring others.

2.3.2 Life frames of nature's values

The previous subsections demonstrated the range of ways people conceive of and relate to nature and its multiple values, but also the absence of interdisciplinary frameworks for organizing these. The life frames of nature's values (O'Connor & Kenter, 2019; O'Neill *et al.*, 2008) help address this gap, relating diverse human-nature relationships, worldviews, values, and nature's contributions to people by representing four categories: living from, living with, living in, and living as nature (see **Tables 2.1**, **2.4**). In the living from nature frame, nature is conceived as resources contributing to and providing conditions for human sustenance and prosperity. Living with nature sees nature as other(s) (e.g., other-than-humans, ecological processes, wild spaces) with their own interests and agency. Living in nature emphasizes

36. Systematic review of value types (https://doi.org/10.5281/zenodo.4396289).

37. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).

38. Analysis of national and international policy documents related to biodiversity and sustainability (https://doi.org/10.5281/zenodo.4399907).

place(s) (e.g., land, landscapes). Living as nature refers to nature as self (physically, mentally, spiritually) without separating humans and nature.

The life frames are not mutually exclusive, but express different ways of being/living and ultimate sources of concern for nature. People often harbour multiple frames (see **Box 2.8**), though one may be emphasized in particular situations. For instance, a river may be seen as a useful resource for fisheries (living from), a harbour of biodiversity (living with), integral to a cultural landscape (living in) or an inseparable part of one's body or community (living as) The life frames can be used to bridge between ecosystem services, nature's contributions to people, and non-anthropocentric worldviews, and for organizing, communicating, assessing, deliberating, bridging, prioritising, and transforming values, and designing valuations. Semantic variations of the frames in different United Nations languages are exemplified in Annex 2.13.

2.3.2.1 Life frame representation in environmental values literature

A systematic review[39] was conducted by screening 7,204 sources to select 499 for coding, alongside a critical review of diverse academic, ILK and policy documents. The review investigated the life frames' potential to organize key sets of broad and specific values regarding nature, nature's contributions to people, good quality of life, and sustainability (see **Table 2.4**). Results showed distinct sets of values clustered with different frames. Living from nature was dominant; living as nature least represented (see **Figure 2.15**). Annex 2.13 provides a full assessment.

Each life frame emphasized different broad and specific value sets **(Figure 2.16)** and nature's contributions to people **(Table 2.4)**. Living from nature correlated strongly with instrumental values (Q = 0.86, Φ = 0.53), emphasizing nature as a means to human ends and satisfaction of human needs and preferences. Broad values emphasized included prosperity, efficiency and security. The frame presents a spectrum from exploitationism to sustainable resource use, with the latter being emphasized in the literature, with some consideration of equitable distribution. Common nature's contributions to people were food and feed (e.g., Russo *et al.*, 2017), energy (e.g., Cameron *et al.*, 2012), freshwater (e.g., Arlinghaus, 2006), medicinal/genetic resources (e.g., Abensperg-Traun, 2009), pollination (e.g., Chain-Guadarrama *et al.*, 2019), soil formation (e.g., Gomiero, 2016), and maintenance of options (e.g., Momblanch *et al.*, 2016). ILK values within this frame are often related to particular subsistence or market resources with instrumental and life-support values (e.g., Dam Lam *et al.*, 2019; Reyes-García *et al.*, 2019). However, such studies rarely indicated indigenous values of living from nature without also referencing other life frames.

Living with nature correlated substantially with intrinsic values (Q = 0.62, Φ = 0.31) and moderately with relational values (Q = 0.44, Φ = 0.22). This frame was associated with broad values like stewardship, responsibility and duty of care, and a strong emphasis on people's contributions to nature. For example, a review of motivations for participation in conservation covenant programs showed that stewardship frequently trumps profitability concerns as a primary motivation, once

39. Systematic review on the conceptualizations of values (https://doi.org/10.5281/zenodo.4071755).

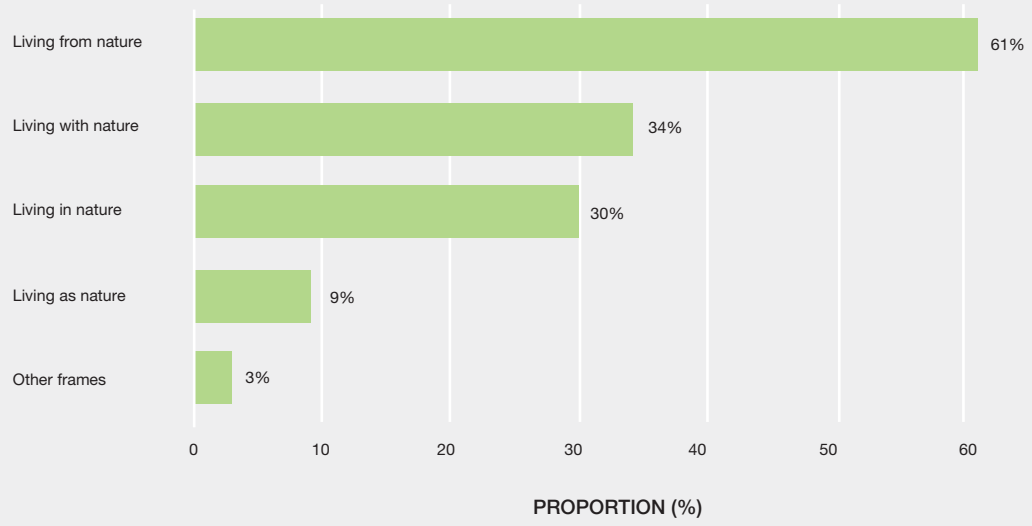

Figure 2 15 **Proportion of documents coded for the life frames in the systematic review (n=499).**

Table 2 4 **The main associations found in the literature between the life frames and their relation to nature, values, nature's contributions to people, sustainability, and risk.**

	Living FROM nature	Living WITH nature	Living IN nature	Living AS nature
Framing of how nature matters	Nature matters for the variety of ways it sustains people's lives and the goods and services supporting human needs and prosperity.	Nature matters as the other-than-human, for its cycles, processes, and the flourishing of many other species. Nature may be benign, threatening, vulnerable, or indifferent. Natural spaces may be seen as wilderness.	Nature matters as the setting for people's lives and practices, their land and home. Particular landscapes and places matter by embodying and contributing to history, culture and meaning.	Nature matters because it helps constitute us physically, mentally and spiritually; people may experience this through relations of oneness, kinship, interdependence and interpenetration with nature.
Framing of sustainability with regard to human-nature relations	Responsible use of natural resources that balances the needs of present and future generations of people.	Protecting biodiversity and ecosystems and considering needs of other-than-humans.	Sustaining landscapes, meaningful places, heritage, and cultural dimensions of nature.	Recognition of oneness and sustaining relations of connectedness, harmony and reciprocity with nature.
Examples of how to nurture sustainability-aligned values	Internalising externalities in decision-making. Resource management arrangements that support intra- and inter-generational equity.	Expansion of protected areas and rights of species; environmental education.	Protection of cultural landscapes and local heritage; improving access.	Measures to support nature (re)connection, e.g. green prescribing, nature ceremonies; emphasise oneness and reciprocity in policy framing / communication.
Examples of broad values emphasized regarding good quality of life	Prosperity, livelihood security, human welfare, distributive justice (intra- and intergenerational).	Stewardship, responsibility, respect, duty, coexistence, care, diversity of life, awe, flourishing, sharing, recognition and distributive justice towards other-than-human species.	Belonging, community, health, meaning, enjoyment, beauty, freedom, uniqueness, procedural justice, distributive justice regarding access to nature/ land.	Oneness & harmony with nature, self-realisation, awareness, reciprocity, care, sharing, respect, kinship, self-determination, epistemic justice.
Specific values emphasized	Emphasis on instrumental values; some reference to eudaimonic relational values (sustaining nature for a happy and prosperous human life) and life-support values underpinning sustenance, security, and prosperity.	Emphasis on intrinsic values (inherent worth, dignity of other- than-human beings); life-support values underpinning survival and flourishing of humans and other- than-humans; also, eudaimonic relational values (relations with nature contributing to a responsible, virtuous human life).	Emphasis on relational values (e.g., nature contributing sense of place, beauty, inspiration, identity, and enjoyment to a healthy, meaningful, and flourishing human life); instrumental values only where place-based aspects are more substitutable (e.g., recreational value).	Emphasis on relational values constituting people-nature communities, eudaimonic relational values (nature's importance for harmony, self-realisation and self-determination); and intrinsic values (e.g., dignity of other-than-humans).
Most relevant nature's contributions to people	Emphasis on material and regulating nature's contributions to people: food & feed, energy, freshwater, medicinal/ genetic resources, labour, soil formation, pollination, habitats, maintenance of options.	Emphasis on regulating nature's contributions to people: habitats, air quality regulation, climate, ocean acid regulation, hazard regulation, maintenance of options. Emphasis on people's contributions to nature.	Emphasis on non-material and context-specific nature's contributions to people: physical and psychological experiences, learning and inspiration, identities, habitats, water quality.	Limited relevance, but associations can be made with context-specific nature's contributions to people, habitats, companionship, identities. Emphasis on people's contributions to nature-as-self.
Worldviews emphasized	Anthropocentric (strong or weak).	Biocentric, ecocentric.	Anthropocentric (weak).	Pluricentric, ecocentric.
Examples of risks from overemphasis	Overexploitation of natural resources beyond their ability to regenerate; negative side-effects of technical solutions.	"Colonial" approaches to conservation; misanthropy.	Using nature for territorial identities to exclude and oppress; static values of place as an obstacle to broader sustainability.	Nature not recognised in its own right; idealisation; insufficient recognition of peoples' resource needs.
Examples of risks from underemphasis	Exporting of environmental impacts; insufficient attention to human development needs.	Mass extinction; degradation of regulating nature's contributions to people.	Loss of biocultural diversity; backlashes against decisions that exclude local values.	Nature disconnection posing risks to well-being and sustainability; epistemic injustice.

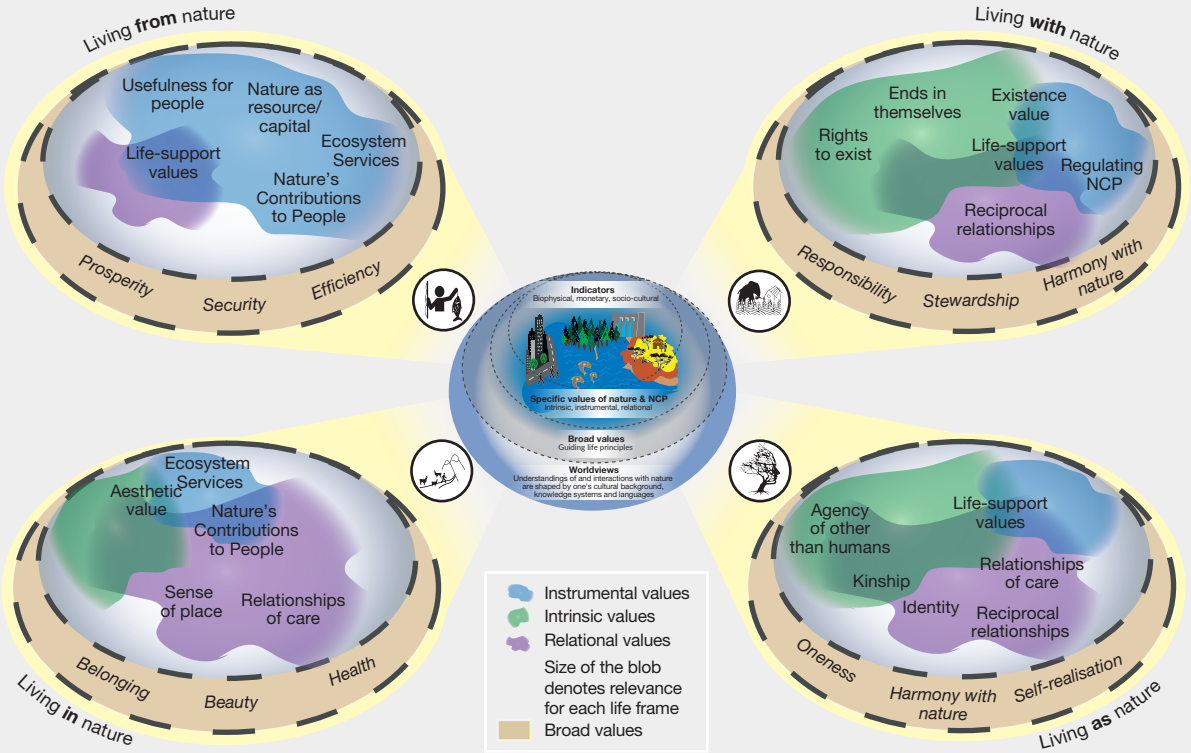

Figure 2 16 **Different value sets within the life frames.**

Living from (up left), with (up right), in (down left) and as (right down) nature frames. Selected values are key examples. Spotlights emphasize different sets of values.

basic economic needs are met (Kabii & Horwitz, 2006). In economics, existence values can partially express this frame **(Box 2.6)**. Living with nature can be associated with regulating nature's contributions to people, particularly habitat creation (e.g., Gardiner *et al.*, 2013), maintenance of options (e.g., Bretzel *et al.*, 2016), air quality (e.g., Escobedo *et al.*, 2011), climate (e.g., Czúcz *et al.*, 2018), ocean acid regulation (e.g., Graham *et al.*, 2014), and hazard regulation (e.g., Cameron *et al.*, 2012). These nature's contributions to people are typically valued as life-support values **(Box 2.5)** benefiting humans and non-humans, including over evolutionary/long-term time scales (Sarrazin & Lecomte, 2016).

Living in nature and relational values frequently co-occur (Q = 0.81, Φ = 0.48), with an emphasis on specific values of place attachment and identity (e.g., Bremer *et al.*, 2018). This frame connects nature-as-place to broad values like belonging, enjoyment, and community. Indirect use and non-use values **(Box 2.6)** can provide economic proxies for living in nature, but this is constrained by many place-based values being non-substitutable (Apostolopoulou & Adams, 2017; Elmendorf, 2008). The entwined relations between people-and-nature and people-and-people expressed through living in nature exist in myriad ways, e.g., in the Japanese concepts of *satoyama* (里山), *satoumi* (里海) and *fūdo* (風土) reflecting dynamic relationships between people, habitats, and species (Takeuchi *et al.*, 2014). Environmental features, such as local climates, species, mountains, or parks, and access to them, help determine place and community (Kim & Kaplan, 2004; Pendola & Gen, 2008; see **Box 2.8**). The frame associates with mixed material and non-material nature's contributions to people, particularly physical and psychological experiences (e.g., Nesbitt *et al.*, 2017), learning and inspiration (e.g., Lintott, 2006), and identities (e.g., Poe *et al.*, 2014), and some regulating nature's contributions to people like water quality (e.g., White *et al.*, 2010) and habitats (e.g., Arkema *et al.*, 2017).

Living as nature sees human–nature relations as non-dual, such as in the concepts of *Pachamama* or the web of life where humans and nature are seen as part of an extended community (see **Box 2.4**). This emphasis supports broad values like oneness, respect, and reciprocity. Living as nature substantially associated with relational (Q = 0.73, Φ = 0.26) and intrinsic (Q = 0.73, Φ = 0.26) values, and negatively with instrumental values (Q = -0.59, Φ = -0.19). However, this frame also challenges abstract value constructs, seeing them as embodied, reciprocal, and dynamic. It expresses life-support values from a view of embeddedness and lived experience. Living as nature supports epistemic justice by explicitly representing relational and holistic worldviews (Glaser, 2006; Strang, 2005), such as reflected in understandings of personhood of

rivers (Hutchison, 2014; Sangvai, 2002). Western examples include deep ecology (Naess, 1973) and the land ethic (Leopold, 2013) **(Box 2.13)**, or in the context of affordances in psychology (Raymond *et al.*, 2017a). The dualistic concept of nature's contributions to people (Kenter, 2018) is less easily applied here, but relevant nature's contributions to people include habitats (e.g., Lepofsky & Caldwell, 2013), companionship (e.g., Bremer *et al.*, 2018), identities (e.g., Ainsworth *et al.*, 2019), and context-specific nature's contributions to people (e.g., Dam Lam *et al.*, 2019).

Box 2.8 The life frames and local values in marine management: the UK coast.

The sea plays an important role in many people's quality of life, but coastal and marine ecosystems are under many pressures (see Annexes 2.5 and 2.12). Within United Kingdom waters, though some are recovering, many fish stocks are depleted, and their management has attracted fierce debate (Huggins *et al.*, 2020). Other debates focus on designation and implementation of protected areas, regeneration of coastal communities, and equitable access to the coast. This case considers local knowledge across United Kingdom coastal communities, based on 144 ethnographic video interviews following the Community Voice approach (Ranger *et al.*, 2016) sourced from diverse projects[40]. Each focused on different policy contexts, which strongly influenced which life frames and associated values people emphasized (see **Figure 2.17**). *Blue Heart* considered the coast's meaning to communities and *Living Coast* aimed at marginalized communities experiencing access barriers. *Common Ground* brought viewpoints from diverse stakeholders on marine protected areas implemented by a regional fisheries management authority.

40. Data courtesy of the Marine Conservation Society, Scottish Association for Marine Science and Centre for Ecology and Hydrology.

Analysis of the interviews (Annex 2.4) showed similar associations between life frames and values as the literature (see 2.3.2.1). Three or more life frames were expressed by 54% of interviewees, 24% expressed four. Sustainability and conservation discourses were primarily (66%) co-referenced with living with nature and frequently highlighted the irreplaceability or basic goodness of nature. Embodied and lived experiences of values were expressed by 32% of participants, representing 60% of living as nature references.

These cases exemplify how local people express nature's values within multiple life frames, but also that valuation design and framing will influence which life frames and associated values are emphasized. While many nature's contributions to people were expressed as important through the living from and in nature frames, local people strongly associated sustainability with values beyond nature's contributions to people. They also clearly pointed to both cognitive and embodied ways of experiencing and expressing values. Thus, if policymakers wish to identify shared values for policies **(Box 2.9)**, and more effectively leverage values towards sustainability transformation, the living with and as nature frames need to be attended to alongside benefits-based framings of nature like nature's contributions to people.

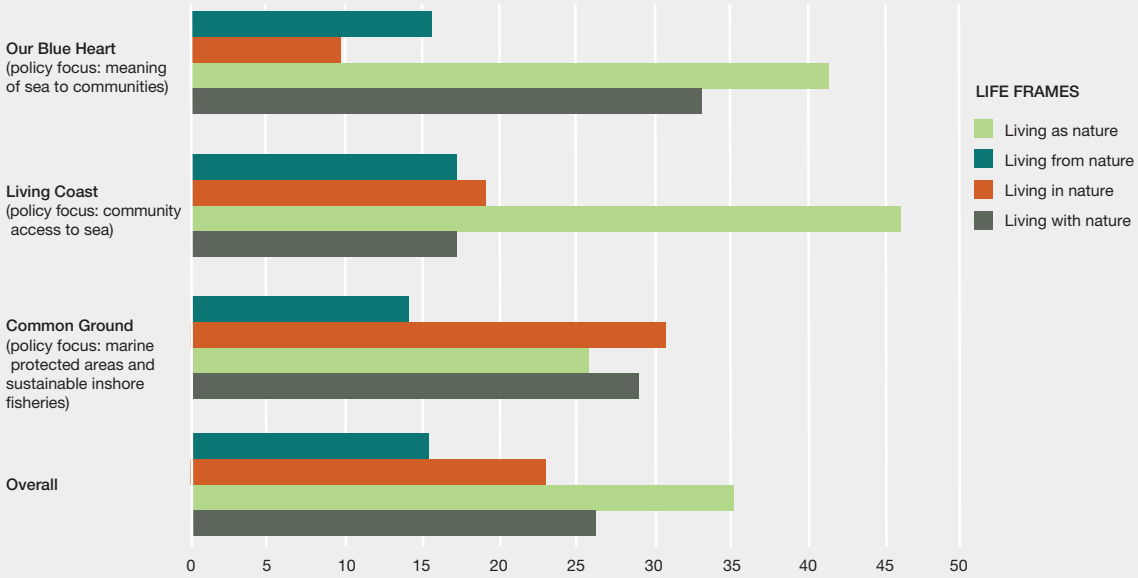

Figure 2.17 **Proportion (%) of interview references to different life frames across marine local knowledge projects.**

2.3.2.2 Representing life frames in policy

The review highlighted a range of concerns regarding over- or under-emphasis of particular life frames in policy (Annex 2.13). For example, the millennium ecosystem assessment (2005) and the IPBES *global assessment* (2019a) both expressed deep concern with the historic overemphasis of living from nature, leading to over-consumption of material nature's contributions to people and severe degradation of biodiversity and regulating and cultural nature's contributions to people, which could be seen as living *against* nature. However, underemphasizing living from nature can lead to importing nature's contributions to people and exporting ecological footprint (Fuchs *et al.*, 2020), rather than reducing domestic consumption of material nature's contributions to people (e.g., through dietary change). Furthermore, the COVID-19 crisis highlighted a major risk from underemphasizing living with nature, when ecological degradation increases infectious disease emergence (IPBES, 2020), while overemphasis can lead to mismanagement of negative nature's contributions to people (i.e., ecosystem disservices, Lyytimäki & Sipilä, 2009), human-wildlife conflicts, and backlashes from local people reliant on nature (Redpath *et al.*, 2013). For its part, overemphasizing living in nature risks overlooking life-support values and regulating nature's contributions to people, such as in unsustainable tourism (Hicks, 2011) or resistance to changing landscapes (DeSilvey & Harrison, 2020), whereas under-emphasis can lead to poor recognition of local and place-based concerns, over-generalisation of values, exclusion, and procedural injustice. For example, plans to partially privatize United Kingdom national forests sparked protests to protect place-based values, eventually forcing policy reversal (Kenter *et al.*, 2015). Finally, overemphasis of living as nature risks idealizing or obscuring natural resource needs (De Bont, 2012; Raymond, 2007), while underemphasis bears substantial issues of epistemic justice when experiential knowledge and embodied values are not represented (Jackson & Barber, 2013). More broadly, increasing disconnection from nature and loss of ecoliteracy (e.g., through urbanisation and loss of green spaces) has been identified as a major risk to both human well-being and sustainability (Cumming, 2016) (see 2.2.2, 2.5.2).

While there is no single right balance of different frames, any decision about their prioritisation leads to different value outcomes that create winners and losers and is intimately associated with questions of justice and power (Kenter *et al.*, 2019; Martínez-Alier, 2002). Explicit recognition of multiple values and knowledges in valuation and policy enhances procedural justice and improves the quality of more inclusive, democratic decisions (Devente *et al.*, 2016; Tengö *et al.*, 2014). Policymakers make choices as to which frames are emphasized in valuations and decisions **(Box 2.8)** and shifting framing away from a predominant living from nature focus towards inclusion of multiple frames can support new pathways for sustainability transformations (IPBES, 2019e). For example, when the European Union's agri-environmental payment schemes were reframed more strongly towards living with nature, self-identities of participating farmers gradually shifted from being producers to stewards of the countryside (Davies & Hodge, 2012). Consideration of multiple life frames allows a more transparent approach to include different sets of values. They provide policymakers with a straightforward and inclusive tool for cross-sectoral communication, and alternatives to combine and relate the diversity of values to sustainable futures (Harmáčková *et al.*, 2021) (see 5.2.3), including in conjunction with the Nature Futures Framework (Pereira *et al.*, 2020) (Annex 2.13).

2.3.2.3 Life frames to nurture sustainability-aligned values

Shifts in broad values are central to sustainability transformation (see 2.2.3.1; 5.2.3). While sustainability-aligned values can be expressed within each life frame **(Table 2.4)**, the review found them most explicitly associated with living with and as nature (Annex 2.13). In the United Kingdom marine case **(Box 2.8)**, sustainability was framed most frequently in terms of protecting biodiversity (living with nature) rather than other understandings, such as sustainable use (living from nature). Living as nature sources frequently consider sustainability transformation as a shift from disconnection and dualism to oneness, such as in many forms of indigenous environmental management based on values like reciprocity and care between people and nature (Annex 2.13). However, broad values that align with sustainability in one context may not do so in another. Whether a particular value manifests as being sustainability-aligned depends on many factors, such as knowledge and awareness, personal and social beliefs and norms, degree to which basic needs are satisfied, control (e.g., access to resources and sustainable alternatives), social networks, and institutional arrangements, such as incentives (Everard *et al.*, 2016).

The life frames make different aspects of justice and sustainability explicit **(Table 2.4)**, providing opportunities to integrate these into policy. For instance, living with nature emphasizes protecting biodiversity to ensure interspecies justice, while living in nature emphasizes protecting cultural landscapes, and local participation to ensure procedural justice. These interpretations can conflict but could also be used synergistically to enhance the scope of and broaden support for sustainability policies. Similarly, interventions like environmental education (see 2.5.2; Annex 2.13) may be most effective if they speak to multiple life frames (Zylstra *et al.*, 2019), such as by teaching about nature as a resource, other species, our place, and as intimately connected to ourselves, including both cognitive and experiential understanding.

2.4 VALUES, HUMAN ACTION AND DECISION-MAKING

This section assesses relationships between values, actions and decisions. Understanding these dynamics provides different entry points for decision-makers to target policies towards desired outcomes regarding the protection of the values of nature and nature´s contributions to people. The section describes key relations between values and actions (see 2.4.1) and focuses on how institutional contexts support (or hinder) certain values to influence decisions (see 2.4.2). Hence, it documents how value expressions and prioritizations depend on which actors have the power to decide and under what institutional context decisions happen. The text is based on insights from several disciplines, particularly anthropology, economics, philosophy, psychology, sociology and non-academic ways of understanding the world (e.g., ILK, other cultural traditions).

2.4.1 Relationships between values and behaviour

2.4.1.1 Why do we do what we do?

Different disciplines understand human behaviour/action differently. This section offers a brief overview of the main positions to provide a basis for more in-depth analyses in later sections, where implications for value assessments and decision-making are emphasized. Two aspects are highlighted. First, there is a divide between conceiving human behaviours as an individual phenomenon versus as also shaped by the social environments in which people grow up and live. Therefore, it is possible to distinguish between individually and socially focused traditions. Second, how human motivation is understood also varies. There is emphasis on the hedonic goal of pleasure (to feel good), gain goals (to improve one's resources, position, etc.) and normative goals (to act appropriately). These motivational aspects are understood differently when seen from an individually versus a socially focused position.

The best known individually-focused model in economics has been nicknamed *Homo economicus*. It sees humans as maximizing individual utility (pleasure), and value is defined as how much one is willing to give up to get something (see 2.2.4). This perspective demands comparable values and is basic to neoclassical economics. Moreover, preferences are considered stable characteristics of the individual. This model is the epitome of rational choice (Becker, 1976, 1993; Hausman, 1992).

Individualist value and behaviour perspectives also have a quite strong position in political science (e.g., Lohmann, 2008) and in some sociological writings (e.g., Hedström & Stern, 2008). These fields are, however, less focused on hedonic goals and more oriented towards gain goals like resources, position, etc. What is common is that behaviour is motivated by individual interests only.

In contrast, socially oriented perspectives emphasize how groups or societies form shared values and integrate them into norms and legal rules (see 2.5.2; **Box 2.9**). Values and norms influence individuals not least through forming their identities (Berger & Luckmann, 1966; Burke & Stets, 2009; Scott, 2014; Searle, 2005), and they underpin the goals motivating action (Parks & Guay, 2009). In this conception, what an individual chooses to do, not only reflects personal traits, but is influenced by the values, norms and practices emphasized by the social context.

As an example, we all need food, and some individuals prefer e.g., sweet to savoury. Nevertheless, socially oriented understandings emphasize that what we eat and how we eat it are influenced by society. For example, people eat certain types of foods during a gathering or ceremony regardless of the personal sweet/savoury preference as they share specific values and meanings of the gathering. People reproduce the practices and values emphasized (e.g., Giddens, 1984; Shove *et al.*, 2012). However, people can also transform these values by deliberately or unintentionally creating new practices based on their 'toolkits' of internalized values and meanings (Sewell Jr, 2005). For example, people may deliberately refuse to cook or eat certain types of foods due to their concern for the environment, transforming the meaning of the gathering to an environmentally friendly one.

Among the socially focused traditions there is, moreover, an emphasis on the distinction between actions based on what is individually best (i.e., gain goal) versus what is considered appropriate; best for the group or society (Hodgson, 2007; March & Olsen, 1995). People are not only egoistically motivated, but able to take the interests of others into account, following norms that define "the right thing to do". Here, a plural understanding of rationality distinguishes between what is individually versus socially rational (Sen, 1977; Vatn, 2015). This perspective emphasizes that our choices are often interdependent, such as when we use a common resource like a local fish stock. In these situations, it is rational for a community to develop rules that limit individual use to favour a better outcome for the group (Ostrom, 1990). Consequently, acts of helping others are understood as (socially) rational. Finally, this understanding does not assume that values must be one-dimensional, rather emphasizing that values are diverse and typically protected by norms.

Turning finally to psychology, we return to a focus on the individual, albeit not necessarily rational. For example, one perspective (associated with behavioural economics) emphasizes how heuristics and various biases characterise choice –especially choice under uncertainty (Altman, 2015; Kahneman, 2011; Kahneman *et al.*, 1982). In contrast, social psychology is predominantly focused on 'social dilemmas' (i.e., when what is individually best is collectively detrimental). It accepts that behaviour is socially influenced, notably by what is termed social norms. Authors in this tradition (e.g., Ryan & Deci, 2000; Schwartz, 1977; Steg *et al.*, 2017; Stern *et al.*, 1999) highlight the role of values and norms when understanding behaviour. A specific issue regards how individuals balance between hedonic (i.e., individual gain) goals and appropriateness. When a normative goal of appropriateness is strongest, people are motivated to do the right thing, even if more costly or less pleasurable, pointing to the intrinsic motivation of pro-environmental behaviour (Steg *et al.*, 2016).

2.4.1.2 Review of behaviour theories

This section moves from a general picture of what characterises human behaviour to a detailed examination of how behaviour theories treat values (as defined in section 2.2). Extensive research demonstrates that the links between values and behaviour are complex, with multiple factors interacting to determine how we act (Fischer, 2017). Therefore, a systematic review was conducted on how 134 theories of behaviour address value-related constructs[41] (see **Figure 2.18**). The review focuses on theories found using the term "behaviour". A wider analysis would include concepts like "practice" and "action." As the latter concepts are more used in socially focused theories, this review tends to overemphasize individually focused theories (though the review includes theories such as social practice theory) (Shove *et al.*, 2012) and actor-network theory (Latour, 2005). Later sections provide further insights into broader social dimensions (see 2.4.1.3; 2.4.2; 2.5.2). Theories in this analysis come primarily from psychology (63%) and economics (13%) with roughly a quarter (24%) from ten additional fields (e.g., sociology, political science, human ecology).

This review analyses value-related constructs in these theories defined to include (a) "values as principles and life goals" (broad values) (see 2.2.3.1), (b) "values as

41. Behaviour theories literature review (https://doi.org/10.5281/zenodo.4399396).

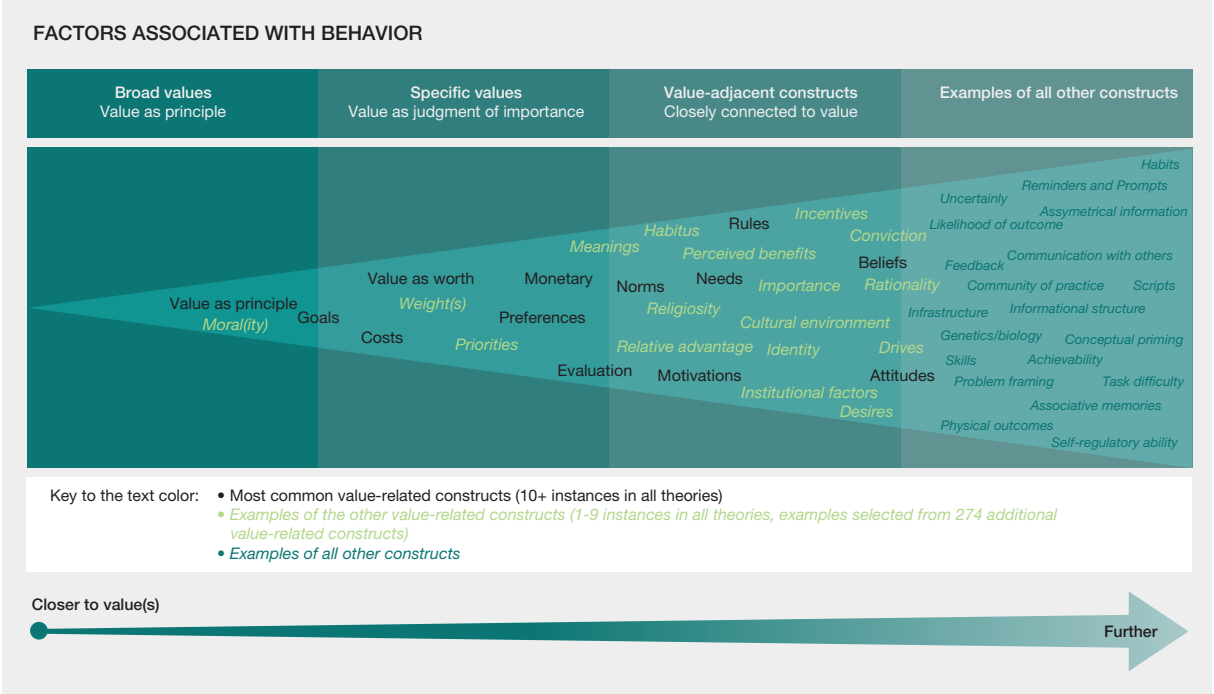

Figure 2 18 **Relative prevalence of value-related constructs and all other constructs in theories of behaviour.**

The increasing size of the cone surrounding the constructs indicates the increasing prevalence of the type of construct (broad values, specific values, value-adjacent constructs, and all other constructs) in the literature. Coding produced exact counts of each, but because theories define and cluster constructs in diverse ways, results are best understood as approximate representations of the prevalence of various concepts.

importance" (specific values) (see 2.2.3.2) and (c) constructs closely related to values (here called value-adjacent constructs; examples include norms and motivations) **(Figure 2.18)**. A systematic, replicable process for including constructs in each category was created.

The analysis demonstrates that values are associated with behaviour in diverse ways, and that many other factors impact these connections. These other factors include demographic characteristics such as income, household size (Poortinga *et al.*, 2004), feelings of self-efficacy (Tabernero & Hernández, 2011), physical capacity to engage (Mitchie *et al.*, 2011), social/institutional structures (Mitchie *et al.*, 2011) and biophysical features (Johansson *et al.*, 2016) The extent to which values are associated with behaviour also depends on the complexity and embeddedness of the behaviour. When a behaviour is relatively simple, like choosing one product over another, people can more easily act on their values to engage in the behaviour than when it is more complex and embedded in larger systems, as in the case of choosing transportation and home heating (Balundė *et al.*, 2019). This lack of a one-to-one relationship between values and behaviour is sometimes labelled the 'value-action gap' (Babutsidze & Chai, 2018; Blake, 1999; Flynn *et al.*, 2009). The review of behaviour theories found that value-related concepts comprise about 29% of theoretical constructs used to explain behaviour (see **Table 2.5**). This result both supports the value-action gap (71% of constructs are not clearly value-related), but also demonstrates that values infuse many factors (29%) related to behaviour.

Table 2 5 **Quantitative assessment of value-related concept.**

Overall statistics	**Total constructs**	2232
	Total value-related constructs	649
	Percentage of constructs that are value-related	29%

	Construct category	Total instances	Number of theories in which the construct appears
Value-related constructs	**Norm**	68	45
	Value as principle	42	28
	Evaluation	38	30
	Motivation	35	25
	Mixed	34	26
	Goal	32	16
	Attitude	31	28
	Value as worth	25	17
	Belief	23	17
	Preference	13	11
	Need	12	8
	Rules	12	11
	Cost	10	8
	Rationality	9	9
	Desire	5	5
	Drive	5	3
	Identity	5	5
	Importance	5	4
	Weight	4	4
	Priority	3	3
	Moral	1	1
	Other value-related constructs	**237**	**93**

The evidence above was supplemented with data from literature reviews that document additional lists of factors that impact pro-environmental behaviour specifically. In all cases, these address at least two categories that include constructs from the analysis above. Kollmuss & Agyeman (2002) include values, motivation and cultural norms (three of ten categories); Steg & Vlek (2009) include moral and normative concerns (two of nine categories); and Gifford & Nilsson (2014) include values, worldviews, norms and goals (three of 12 categories). It is notable that these proportions from reviews of pro-environmental behaviour roughly mirror the 29% of constructs the extensive analysis of behaviour theories identified as value-related.

In sum, analysis of theories of behaviour indicates that values are associated with behaviour in important ways, but that many other factors are also associated with behaviour. This work thus emphasizes the importance of considering both the different forms of values-behaviour links (e.g., how values embedded in institutions impact behaviour) and how additional factors (e.g., personality, knowledge, physical contexts) are associated with behaviour.

2.4.1.3 Values as embedded in institutions

Institutions such as norms and legal rules are created to protect certain values. They prescribe what may/may not or must/must not be done under certain conditions (Crawford & Ostrom, 1995; Scott, 2014; Vatn, 2005). While norms are grounded in civil society, legal rules are (also) supported by an external power that has tangible and formal sanctions, such as the state or traditional leaders (Crawford & Ostrom, 1995; McGinnis, 2011). Laws typically define and protect rights. This regards rights to natural assets – property and use rights – and laws that protect biodiversity, regulate pollution etc. The literature also shows that in societies where legal rules are consistent with the values and norms generally held, there is higher compliance (Platteau, 2000; Tyler, 1990). In the social sciences, norms are seen as structuring interaction (Berger & Luckmann, 1966; Hodgson, 1988; Searle, 2010). They influence both how we should treat each other and nature. When internalised during the process of socialisation, they become part of people's identity and form what is seen as the right thing to do. Even if not internalised, they may be followed due to fear of sanctions/shaming from fellow community members. So, one may avoid littering due to expected sanctions. One may, however, also avoid such a practice as one is a person that simply does not litter. Schwartz (2012) is among those pointing out that individuals may comply with or rebel against norms based on whether conformity or self-direction is more important.

The distinction between norms and legal rules may be fuzzy – not least in indigenous cultures (Eghenter, 2018; Nahuelhual *et al.*, 2018). Spiritual practices often linked to ancestors may be important when forming institutions (Caillon & Degeorges, 2007; Deb & Malhotra, 2001; Michon *et al.*, 2007; Singh, 2013), and kinship structures are typically integral to maintaining them (Tamez, 2012). For example, traditional management systems are maintained through knowledge transmission between generations such as the women-led management system of an orchid, locally called *calaverita*, in Mexico's Chilapa region (Herrera-Cabrera *et al.*, 2018).

In identity theory, it is standard to distinguish between person(al), social and role identity (e.g., Burke & Stets, 2009). While personal identity refers to how the individual perceives her-/himself, social identity deals with the function and status of a person as a member of a group or community. Role identity regards the self as occupant of a role in an organization, firm etc. Moving between roles and communities, we may act differently as norms form different expectations – i.e., the logic of action changes. Life becomes "compartmentalised" (MacIntyre, 1999). Furthermore, the organization and the community may emphasize different norms and hence values to the ones that are key to the person. While institutions are key to forming the individual, their role in forming organizations – political, civil as well as business-oriented ones – goes further. The character and existence of organizations are based on the rules that define their aims and govern the activities of members/employees (Scott, 2014).

The above offers an explanation for the value-action gap (see 2.4.1.2). Following norms and practices will support the values around which they were formed (Vatn, 2015). However, people may not explicitly recognise the values involved, but still support them by following the norm. Moreover, people tend to act like others (Cialdini, 2003; Demarque *et al.*, 2015; Nolan *et al.*, 2008), not necessarily reflecting on what values are being supported this way.

The stage I literature database was used to review 232 publications that addressed institutions as a key topic[42] (see 2.1.3). Studies of legal rules were more frequent, while a subset also emphasized norms. Legal rules related to studies of international environmental agreements and economic instruments. Norms focused on religion, food preparation ceremonies and farming practices. Implicit value expressions were found in both legal rules and norms. The values emphasized tended to differ, although the difference was not statistically significant. Relational values were most emphasized in studies of norms, followed by intrinsic and instrumental values (equal number). In studies on legal rules, instrumental values came first, followed by relational and intrinsic values. The analysis indicates that norms were primarily built on values related to identity, care and human-nature relationships, while legal rules were more

42. Systematic review on the conceptualizations of values (https://doi.org/10.5281/zenodo.4071755).

strongly associated with values related to resource use and distribution.

In the stage II literature review focused on ILK sources, instrumental and relational values were predominantly associated with institutions[43]. To illustrate, understanding nature as a source of use value and as sacred locations underlie the institutions for forest management in several places, as illustrated by studies of villages in West Bengal, India (Deb & Malhotra, 2001).

Understanding the relationship between institutions and values can help identify leverage points for change. Redefining roles and their responsibilities can bring about a change in which values become emphasized and consequently in the type of actions that individuals and groups engage with (Abson *et al.*, 2017; Chan *et al.*, 2020; Fischer & Riechers, 2019) (see 2.5.2). For example, if the expectations implicit in professional norms imply actions that go against care for nature and nature´s contributions to people, it is difficult for an individual to act against these expectations (MacIntyre, 1999; Vatn, 2015).

2.4.1.4 Linking institutions, power relations and socio-environmental conflicts

Power is the capacity of actors to mobilize agency, resources and discourses to achieve their goals. An important aspect of this regards the shaping of institutions. Power analysis provides insights to questions such as: Who makes decisions about nature / nature´s contributions to people? Who benefits or loses from particular decisions? What types of values tend to be prioritized or marginalized through different institutions (i.e., norms, legal rules, practices)? Power in the context of human-nature relationships can be manifested in multiple ways/dimensions through discourses and social structures (Bennett *et al.*, 2018; Epstein *et al.*, 2014; Kashwan *et al.*, 2019; Lorenz *et al.*, 2017; Raik *et al.*, 2008; Svarstad *et al.*, 2018) **(Figure 2.19)**. These power dimensions are not mutually exclusive. They can reinforce or conflict with each other in multiple ways and operate at diverse temporal and spatial scales. Power around nature/ nature´s contributions to people is constantly disputed and enforced by actors that are part of power hierarchies. A more comprehensive assessment of power analysis and dimensions is found in Annex 2.1. Main aspects and categories as used in this assessment are presented below.

Discursive power is the power of discourses, narratives, or knowledge production to shape or construct worldviews, life frames, identities, truths, and values. Dominant narratives reinforce particular options and associated values by excluding other actors' narratives, worldviews and values (Feindt & Oels, 2005). For example, in the implementation of payment for ecosystem services schemes in Lima's watersheds, discursive power (e.g., water need for the "thirsty desert city"), was used to elevate urban stakeholders' values and interests over those of upstream communities (Bleeker & Vos, 2019). However, less powerful actors may have power (agency) to produce reality through their own discourses and day-to-day practices (Bennett *et al.*, 2018), including through forms of artwork both written and otherwise (Garrard, 2016, 2017).

Framing power is an important form of discursive power. It regards how issues (e.g., in development projects, education, research, valuation processes, decision-making) are understood, communicated and discussed (see Annex 2.14, Chapter 4). This dimension highlights how these processes (and associated tools) can, through the way they present issues, favour certain human-nature relational models (Linnell *et al.*, 2015; Muradian & Pascual, 2018), knowledge systems and rationalities, and associated values (Vatn, 2009). For instance, South American delegations opposed the ecosystem services concept in the context of the IPBES conceptual framework development, because it conflicted with their worldviews, knowledge and values (Borie & Hulme, 2015). The framing was negotiated, and the final framework (Díaz *et al.*, 2015) recognized both ecosystem services (academic knowledge) and Mother Earth (ILK).

Structural power works through historic-specific socio-cultural, political, and economic systems that reproduce social positions and hierarchies among social groups and reinforce the prioritization of certain values. Individuals exercise power over others because of their position in social structures and their capacity to form such structures/ institutions (Raik *et al.*, 2008) such as class, race and caste relations, or capitalistic markets (Bennett *et al.*, 2018). For example, political ecologists have analysed how class-based relations under capitalism drive capital accumulation through environmental and social injustices (Bennett *et al.*, 2018; Svarstad *et al.*, 2018). Patron-client relationships are also important examples of structural power (Annex 2.11) Structural power is manifested, for example, through rule-making power and operational power.

Rule-making power is the power of actors to create institutions including the opportunity to bias them toward their interests and values. Rule-making is a political process aimed at the establishment of formal or informal institutions regarding access, use and responsibilities over nature/ nature´s contributions to people (e.g., property/ use rights, rules for watershed or landscape management). Exclusion may happen in many ways, as illustrated by cases of watershed management, where peasants are often excluded from decision-making and their relational values are therefore less reflected in established rules (e.g., prohibition of crops; Kothari *et al.*, 2015).

43. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).

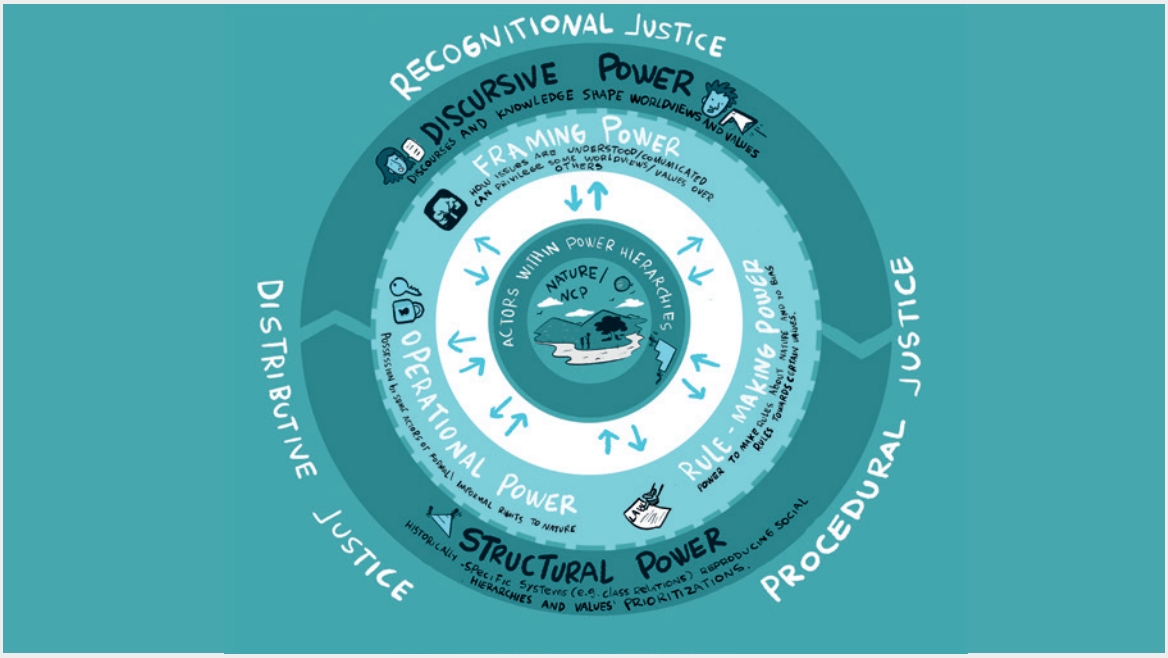

Figure 2 19 **Power and environmental justice dimensions in nature valuation and decision-making contexts.**

Operational power is the power of actors being offered the above-mentioned formal or informal rights in nature/ nature´s contributions to people to determine the use of these assets and therefore what and whose values are emphasized (Bromley, 2006). Such power also includes control and monitoring responsibilities that ensure people's compliance. The distribution of operational power through specifying property and use rights to nature and nature's contributions to people play an important role in influencing both the distribution of income and the status of nature (Vatn, 2015).

Analysing the power relations embedded in institutions (conventions, norms and rules) is an important step towards achieving environmental justice regarding access to nature's contributions to people (Zafra-Calvo *et al.*, 2020) **(Figure 2.19)**. Environmental decisions are contested as some actors (including other-than-humans) are positively and others negatively impacted (McShane *et al.*, 2011) **(Box 2.11)**. Thousands of socio-environmental conflicts have been documented globally between local communities and state-led or private development and conservation projects (Temper *et al.*, 2015), reflecting value conflicts and power disputes over nature (Rincón-Ruiz *et al.*, 2019, 2021). For example, conflicts between local communities and mining companies are observed on all continents (EJOLT, 2021) implying conflicts between – on the one hand – access to minerals (instrumental value) and – on the other – relational and intrinsic values as well as traditional instrumental values (e.g., food products). Powerful actors may even use media-power and / or violence to protect and reinforce their interests and values (e.g., assassinations of environmental defenders) (Global Witness, 2020; Scheidel *et al.*, 2020). In addition, in many cases the establishment of protected areas can produce conflicts due to incompatible life frames, one focused on preserving nature and intrinsic and life support values as endorsed by conservationists (living with nature), and local peoples' seeing their land as securing their livelihoods and place (living from and in nature), prioritising relational and instrumental values (e.g., Cumming, 2016; De Pourcq *et al.*, 2017).

2.4.2 Values in valuation processes and different decision-making contexts

This section develops the above insights further in a more in-depth analysis of how expressions and prioritizations of values are influenced by institutional contexts. The section starts by looking at the different ways values can be expressed under various contexts. Next it looks more specifically at how valuation methods frame values expression – i.e., the implicit or explicit articulation of values by actors and institutions. The last section analyses what type of values are and can be emphasized in decision-making processes of different kinds.

2.4.2.1 Value expressions under different contexts

Valuation and decision-making regarding nature/ nature´s contributions to people are framed by institutions. Procedures for valuing nature's contributions to people, rules structuring decision-making as in a community assembly or firm, procedures regarding the formulation of an environmental management plan are all examples of this. The rules define (a) what type of actors should participate (politicians, representatives of industry, experts, citizens, etc.) with their associated knowledge systems and worldviews; (b) how they can participate (e.g., verbal exchange, written forms, in a group-based or individual-based formats); (c) the form information should take (e.g., qualitative, quantitative), and (d) the appropriate process to reach a conclusion (e.g., voting, deliberation and consensus, statistical aggregation). All these rules ultimately define what values of nature can be accounted for in nature / nature's contributions to people valuation and decision-making. Valuation and decision-making processes are therefore not neutral but reflect inherent power relations (e.g., framing power, rule-making power).

The above understanding points towards several questions that need to be evaluated when organizing valuation and decision-making processes: What knowledge systems, worldviews or values are at stake in a given context? Which values can be taken into account and which ones will be excluded? What are the sustainability and justice implications of including/excluding certain knowledge systems, worldviews or values? What possible conflicts can emerge due to the inclusion and exclusion of certain knowledge systems, worldviews or values? How can valuation and decision-making be transformed so that the rules regarding the integration of values become more transparent?

Figure 2.20 indicates how valuation and decision-making processes may influence value expression in different ways. People's values (see Box A) cover instrumental, relational and intrinsic dimensions that further may relate to different worldviews and life frames. Actors may express values explicitly or implicitly. Explicit value expressions take oral or written forms (Box B). They may be value expressions by communities/IPLCs (e.g., a community assembly stating what values to prioritize in their forest management plan); pricing in markets (commodities); procedures in public decision-making (where there are rules explicitly defining what to prioritise) and valuation using valuation methods (e.g., nature, behaviour and statement-based methods) including integrated valuation methods (see 3.2.2.4).

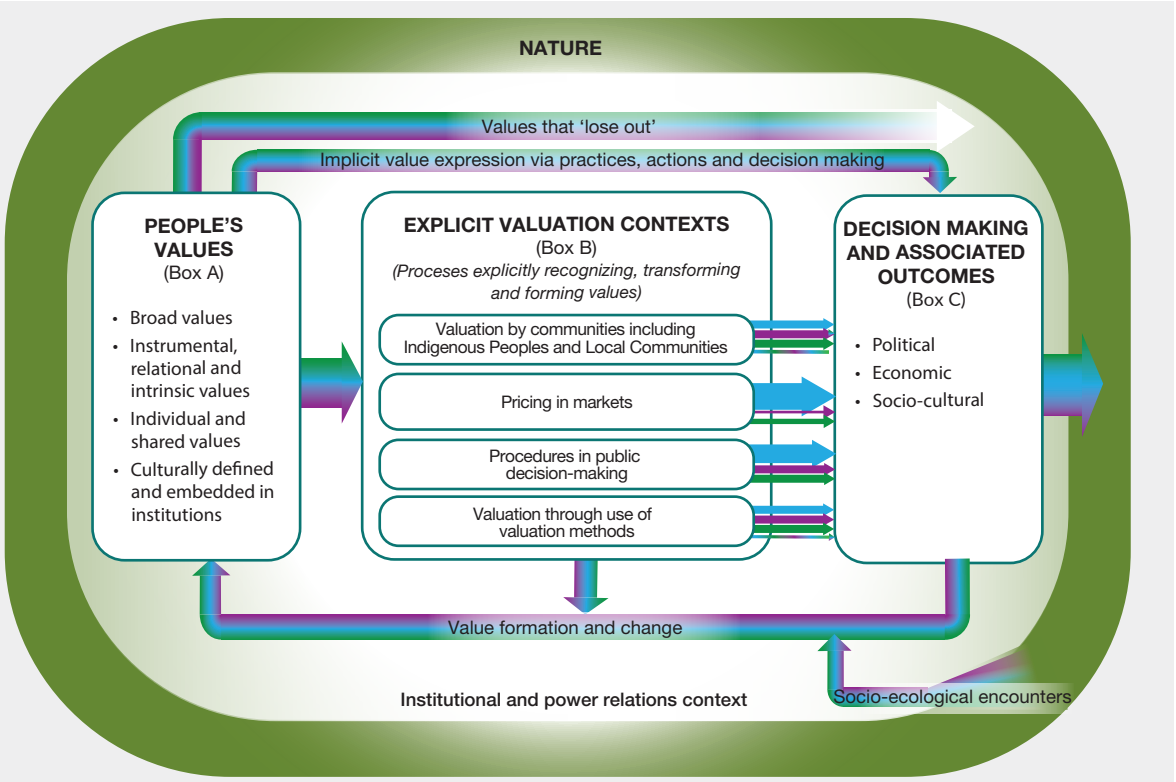

Figure 2 20 **Multiple ways in which valuation methods influence value expressions.**

Valuations inform decision-making and action contexts (see Box C) (Gómez-Baggethun & Martín-López, 2015; Kenter *et al.*, 2015). As seen from **Figure 2.20**, the form of explicit value expression influences what types of values are emphasized (e.g., market information is dominantly focused on instrumental values, while community valuation may facilitate expression also of relational and intrinsic values). Furthermore, some values may be excluded by explicit valuations (due to the rules and assumptions behind them) and may not inform decision-making (see **Figure 2.20**; arrow: values that 'lose out'). Finally, while values are important, we remember from Section 2.4.1.2 that decision-making is influenced also by many other factors – a fact that **Figure 2.20** does not cover.

So, what values are expressed, how they are expressed, and which values are excluded from the process, will depend on how the valuation is framed and undertaken. Both disciplinary and non-academic knowledge systems play important roles regarding how to frame and carry out valuations. The behavioural model of mainstream economics understands values as individually-based – represented by how much one is willing to give up to get something and therefore expressed through a common scale or metric, typically money. Moreover, markets are seen as the ideal institutional structure for valuing. If values cannot be traded – turned into commodities – this approach favours simulating hypothetical markets to elicit the willingness-to-pay. The 'values of society' – also called 'social values' – are then aggregations of individual value expressions. Socially focused academic fields emphasize the importance of institutions for value expression (see 2.4.1.1, 2.4.1.3). Worldviews, life frames and values are embedded in the institutions of a society, which in turn are internalized by actors (e.g., individuals, social groups). They see values as cultural phenomena creating intersubjective meaning acquired through social interactions. From this perspective, values are not framed as purely individual, but rather seen as shared (Kenter *et al.*, 2015). Shared values typically regard common goods, such as nature and nature´s contributions to people and are formed through social processes **(Box 2.9)**.

Box 2 9 What are shared and social values?

Shared and social values are diffuse terms that have different meanings across different disciplines. They have been defined based on the concept of value (broad or specific), who provides them (societies, cultures, communities, groups or individuals), their scale (value to society or individual), their intention (other-regarding or self-regarding), and their process of expression (through social processes or individual elicitation; Kenter *et al.*, 2015). In general, shared values refer to the values that people express collectively, in groups, communities, and across society as a whole. The term social values has been used in many ways, e.g., as broad values that influence specific values and behaviour in relation to nature conservation (Manfredo *et al.*, 2017), as sustainability aligned values embedded in religions (Ives & Kidwell, 2019) or that drive sustainability behaviour of companies (Fordham & Robinson, 2019), or as shorthand for sociocultural value indicators (Kronenberg & Andersson, 2019; see 2.2.4).

Especially in economics, social values often refer to specific values and indicators at a social scale, which can either be established by analytically aggregating individual values, or through social processes (shared social values; Kenter *et al.*, 2015). Developing effective approaches for assessing social values is one of the most significant challenges of environmental valuation (Parks & Gowdy, 2013). Aggregation from individual to social values is a conceptually and ethically challenging task. Values to be aggregated must be assumed commensurable, which can be highly problematic. Furthermore, aggregate social values may differ depending on whether everyone is considered equally or whether some are privileged. For example, the value of flood regulating nature's contributions to people may be highest near expensive houses. If this value is used to guide investment in nature-based solutions, this could lead to inequitable decisions. This can be addressed by equity weighting values (which accounts for that the wellbeing associated with a single unit of money is inversely related to income) (Ebert, 1986), but ultimately a decision needs to be made about what particular distribution is fair (Martens, 2011). Similarly, a decision needs to be made as to how to (dis)count future values against the present, and how to account for risk and uncertainty, which have been matters of fierce debate (Stern, 2021). Finally, the values of minority groups may be masked by aggregation (Howarth & Wilson, 2006). As such, how values are aggregated depends on a set of meta-values that are embedded in valuation institutions (Kenter *et al.*, 2016a). The way these normative questions are addressed in methods such as cost-benefit analysis is as much based on past practice, political forces, and bureaucratic pragmatism as theory (Hockley, 2014).

Shared values can be formed through long-term processes of value formation and socialisation, and shorter-term processes, particularly group deliberation. Long-term formation of shared sustainability-aligned values involves recursive interaction between individuals, groups and culture (Ishihara, 2018), and progressive rippling out of values from niches to broader society through social learning and cross-sectoral institutionalisation (Everard *et al.*, 2016). In terms of shorter-term processes, individualism has dominated in Western valuation contexts. However, in many non-Western contexts, group-based decision-making is common, often involving formal or informal deliberation (Christie *et al.*, 2012; Gould *et al.*, 2019; Kenter *et al.*, 2011). Deliberation is a process of learning, discussion, and consideration of options to form reasoned opinions (Kenter

Box 2 9

et al., 2016c). Deliberative valuations can form shared social values whilst navigating conflicts between different values (Hansjürgens *et al.*, 2017; Irvine *et al.*, 2016). They include increasingly diverse approaches, from established deliberative methods (e.g., Renn *et al.*, 1995) applied to economic valuation (Lienhoop *et al.*, 2015; Spash, 2008), to ethnographic and arts-based approaches that emphasize local knowledge and place (Edwards *et al.*, 2016; Kohn, 2013; Ranger *et al.*, 2016). Scholars endorsing these perspectives highlight the need for valuation to be more transformative (Kenter, 2016), normative (Ravenscroft, 2019) and democratic (Lo & Spash, 2012), moving beyond self-interested instrumental rationality (Hansjürgens *et al.*, 2017; Massenberg, 2019).

In deliberation, participants can act as citizens rather than consumers, frequently drawing on values towards the common good (Dietz *et al.*, 2009; O'Neill *et al.*, 2008; Vatn, 2009). This is important because there is often a mismatch between consumer preferences and sustainability-aligned values (Norgaard, 2010; Sagoff, 1986). Deliberative valuation methods do not assume that diverse values can be commensurated into monetary indicators. However, monetary shared social values can be deliberated directly to reflect socially desired allocations of resources (Orchard-Webb *et al.*, 2016). Justice questions in terms of who wins and who loses out from policies can be considered explicitly. Whilst such processes do not necessarily lead to consensus, they may lead to greater acceptance and legitimacy of solutions (Lo, 2014; Ranger *et al.*, 2016).

Some empirical studies suggest that shared values may be more robust than non-deliberated values; are preferred by valuation participants for policy (Clark *et al.*, 2000; Kenter *et al.*, 2014; 2016b); and facilitate uptake in decisions (see 4.6.6). These potential benefits are contingent on the inclusiveness of the process. However, shared and individually aggregated social values do not necessarily diverge and can also be used in tandem (Brouwer *et al.*, 1999; Raymond *et al.*, 2014). Shared values approaches are most salient when faced with substantial uncertainty, many constituencies and potential for conflict (Ainscough *et al.*, 2018; Clark *et al.*, 2000; UK NEA, 2014).

Box 2 10 Value articulation in watershed management: Klamath River.

The Klamath River is the United States of America's fourth largest. It spans two states, five Indian reservations and the Yurok and Taruk tribal nations, hosts productive spawning grounds for threatened Pacific salmon and is one of the most biodiverse regions in western North America (Mucioki *et al.*, 2021). There are indigenous communities that depend on water from Klamath: the Hoopa, Yurok, and Karuk Tribes, Quartz Valley Indian Reservation, Resighini Rancheria, Shasta Indian Nation and the Klamath Tribes (Sarna-Wojcicki *et al.*, 2019).

During the 20th century, the federal government built dams and drainage infrastructures to ensure water availability, support irrigation and produce energy. These projects provided affordable, renewable electricity and transformed large areas into arable land. However, infrastructures blocked salmon passage and reduced water quality. This impacted indigenous peoples' way of life, commercial fishing off the Pacific coast (relational and instrumental values) and threatened fish and wildlife populations (intrinsic values). In 2001, conflict ignited when a federal agency withheld irrigation water to protect endangered fish, resulting in >$200 million agricultural losses. Thousands protested publicly, and some people illegally diverted water to crops. The media branded it a "water war" of "fish vs. farmers". Subsequently, the federal government stopped withholding water from agriculture, resulting in record-high fish kills, costing fishers >$80 million and threatening indigenous cultural continuity and food security (Chaffin *et al.*, 2014; Sarna-Wojcicki *et al.*, 2019).

In 2006, Klamath dam licenses expired and protests from indigenous and environmental groups led the operating company to launch a collaborative process to negotiate conflicting values and decide the river's future (Sarna-Wojcicki *et al.*, 2019). More than 140 stakeholder groups participated to produce the Klamath Basin Restoration Agreement, which includes the removal of some dams and maintenance of higher water levels to satisfy multiple stakeholders' needs and values (Biondini, 2017). Unfortunately, the Agreement was never funded and conflict over water in the Klamath basin continues today.

The crisis in the Klamath basin revealed conflicting worldviews and values across stakeholders. Further, the divergent perspectives were inequitably expressed in the management rules (approaches and governing policies) because of power asymmetries. Treaties between indigenous peoples and the federal government ran counter to traditional ways of relating to nature as implicit value expressions. The investments in physical infrastructure along the Klamath also implied creation of organizations like the Bureau of Reclamation, managing the watershed based on a worldview aimed at regulating nature to increase economic output. As public environmental perceptions shifted in the 1970s, new laws like the Endangered Species Act provided institutional leverage points to counter the values embodied in such productivist systems, opening to more diverse life frames.

This conflict manifests fundamental paradoxes – i.e., the conflicting values and life frames underlying the irrigation projects, the Endangered Species Act and federal-indigenous treaties. The socio-environmental crisis reflected in the context provided an opportunity to create collaborative, bottom-up

Box 2 10

decision-making bodies (e.g., transient "collaborative" forums aimed at dam relicensing) that allowed diverse values and worldviews, including ILK, to be expressed. As a result, a viable solution arose that had the potential to deescalate the conflict if it had been funded (Chaffin *et al.*, 2014).

Values can also be expressed implicitly through actions like everyday practices (**Figure 2.20**, arrow: implicit value expression). Examples may include a person's decision to buy organic food – expressing an intrinsic value (see also 2.2.3; Honkanen *et al.*, 2006); classification of edible species by indigenous communities oriented by their instrumental value (Balakrishnan *et al.*, 2017); and ritual offerings to *Pachamama* performed by IPLC expressing a relational value of care (Salvucci, 2015). Actions such as habits can be a value expression even if people do not consciously think about them (e.g., filling up the washing machine before using it) (Bardi & Schwartz, 2003; Martínez-Espiñeira *et al.*, 2013). Watershed management also exemplifies that values are often implicitly expressed, as when some rules around land use favour more powerful actors and their values over less powerful ones (Arias-Arévalo *et al.*, 2017) (see 2.4.1.4, Annex 2.1). The value prioritizations implicit in water management regimes may become a source of visible conflicts over water use, as in the case of the Klamath River in the Unites States of America (see **Box 2.10**; Annex 2.6).

Values can also be transformed or constructed through socio-ecological processes (arrow: socio-ecological encounters) (see 2.5.1). Values may moreover change as an effect of the value expressions and decision-making procedures themselves (illustrated in **Figure 2.20** by the feed-back arrow: value formation and change) (see 2.5.1). Both explicit and implicit value expressions are influenced by power relations and the more general institutions within a society (see 2.4.1.4). Also, valuation and decision-making procedures may differ in how they deal with value conflicts and their assumptions regarding value comparability and compatibility (see 2.4.2.2, 2.4.2.3).

In sum, **Figure 2.20** highlights that efforts to analyse and transform values toward sustainability and justice require not only facilitating the use of valuation methods, but also analysing and transforming the institutions that influence human action more at large (e.g., markets, public decision-making procedures, practices) requiring a broad understanding of human motivation and action. The next two subsections will expand on the understanding of valuation methods and decision-making as institutionalized forms of value expressions.

2.4.2.2 Values and valuation methods

Valuation methods are procedures aimed at recognizing or measuring values (see Chapter 3). They are 'value articulating institutions' based on rules defining which values can be expressed and in what form (Cook *et al.*, 2020; Kallis *et al.*, 2013; Šunde *et al.*, 2018; Tadaki & Sinner, 2014; Vatn, 2009). They are therefore not neutral devices (see 2.4.1.4; Annex 2.14). Important rules regard: (i) who should participate and in what role, (ii) the form of the valuation process, (iii) what is considered data, (iv) treatment of value conflicts and issues around comparability/compatibility of values and (v) how recommendations should be made (Jacobs, 1997; Vatn, 2009) **(Figure 2.21)**. Here examples regarding how valuation methods influence value expressions. Regarding the relevance and robustness of these and other examples, see Chapter 3.

Participants and roles: Valuation methods define who can participate and according to what role and competence (e.g., as consumers, citizens or experts) (Cook *et al.*, 2020; Martín-López *et al.*, 2014; Vatn, 2009) – influencing what human-nature relationships (life frames) and rationalities (e.g., self-interest, reciprocal, other-related) are emphasized (Vatn, 2009). For example, in contingent valuation studies, participants are assumed to participate as consumers and expected to express willingness-to-pay (instrumental value) for the marginal provision of the commodity at stake (Martín-López *et al.*, 2014). Other approaches, such as social multicriteria evaluation, may emphasize individuals' participation as stakeholders (Šunde *et al.*, 2018), facilitating the expression of diverse (even conflicting) views on human-nature relationships and values (Saarikoski *et al.*, 2016). Experts also express values when constructing biodiversity indicators reflecting their adherence to the intrinsic value of species or ecosystems (Duelli & Obrist, 2003). Deliberative processes typically emphasize the role of the citizen and social rationality (Dietz *et al.*, 2009; O'Neill *et al.*, 2008).

Valuation process: Valuation methods define how participants should contribute – individually and/or as part of a group, in writing or orally. Important issues regard if communication between participants is possible/facilitated; if values are seen as fixed or as changeable; how complexity and uncertainty should be addressed. For example, willingness-to-pay is expressed by individuals assuming stable preferences/values (Vatn, 2009). Individual-

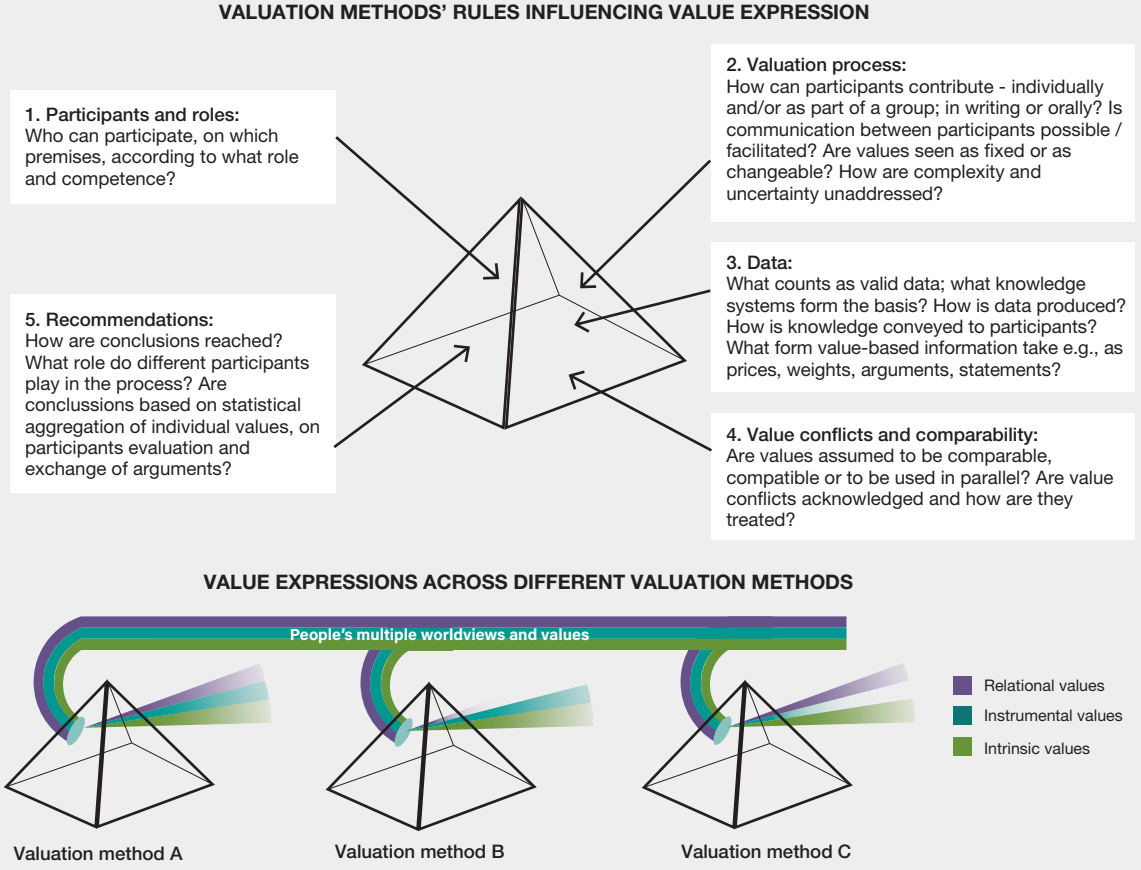

Figure 2 21 **How valuation methods influence value expressions.**

While people's values may cover a spectrum of all value types, the choice of a valuation method will influence which values are expressed.

based non-monetary methods such as interviews, may focus on capturing diverse life frames and values. In some deliberative group-based valuation methods, participant focus is on the possibility to construct shared values **(Box 2.9)** acknowledging complexity and conflicts (Jacobs *et al.*, 2018; Popa & Guillermin, 2015; Ravenscroft, 2019; Šunde *et al.*, 2018; Vatn, 2009), assuming that values are not fixed (Gasparatos & Scolobig, 2012; Tadaki & Sinner, 2014). For example, in a choice experiment, Kenter *et al.* (2011) found that in contrast to initial individual-based responses, after deliberation participants were unwilling to trade-off nature´s contributions to people against money.

Data: Valuation methods frame what counts as valid data; what worldviews and knowledge systems form the basis. This regards issues like how data are produced and communicated and what form value-based information should take (e.g., as prices, weights, arguments, statements). Valuation methods frame both value inputs and outputs by emphasizing the validity of certain knowledge systems, worldviews and life frames. IPLCs, industry, citizens, scientists and policymakers may emphasize different knowledge systems, worldviews and thus values (Cook *et al.*, 2020; Kallis *et al.*, 2013). The choice of measures and indicators also influence outcomes (Šunde *et al.*, 2018; Tadaki & Sinner, 2014). The non-monetary indicator of willingness-to-allocate-time for nature´s contributions to people conservation may exclude the values of social groups with high time restrictions, such as women reinforcing gender inequalities (Medina & Arche, 2015; Tilahun *et al.*, 2015). Because willingness to pay is affected by income distribution, low-income groups will state low economic values even if attributing high importance to nature. Weighting to correct for income distribution have been proposed (Adler, 2016; Boardman *et al.*, 2018).

Value conflicts and comparability: Valuation methods define if values are assumed to be comparable, compatible or to be used in parallel (see 2.2.3.3). Key issues regard to what extent value conflicts can be acknowledged and how they may be treated. Valuation methods handle value conflicts and the (im-)possibility to translate multiple value dimensions into a single value measurement differently (Gasparatos & Scolobig, 2012; Martín-López *et al.*, 2014; Vatn, 2009). Economic

valuation assumes that declined consumption of one good (attribute) can be compensated by increased consumption of another (Hanley & Czajkowski, 2019). However, people can reject the expression of the value of nature in monetary terms and the trade-offs that such translation entails (Temper & Martinez-Alier, 2013) **(Box 2.6)**. Assuming that diverse values can be compared and ranked by a common unit or standard may be problematic when diverse worldviews with diverse values coexist (Jacobs *et al.*, 2018; Tadaki & Sinner, 2014) (see 2.2.3.3). Valuation methods based on participation and deliberation (e.g., participatory scenario planning, social multi-criteria evaluation) may foster mediation of value conflicts (Rincón-Ruiz *et al.*, 2019).

Recommendations: Valuation methods frame how conclusions are reached and what role different participants play in that process. A key question regards whether conclusions are based on statistical aggregation of individual values or on participants' evaluation and exchange of arguments. Some deliberative approaches are aimed at consensus; in others, conclusions are reached through voting. However, this would not necessarily resolve value conflicts. In cost-benefit analysis, recommendations are based on the net present value. However, there is disagreement among economists on the choice of the proper discount rate (Beckerman & Hepburn, 2007; Davidson, 2015), which highly influences net present value measurements.

The *Exxon Valdez* oil spill in Alaska, Unites States of America in 1989 illustrates the issues raised above (Fourcade, 2011). Contingent valuation was used to litigate a claim for the loss of non-use values. A survey among the English-speaking United States population showed that the aggregate monetary loss of non-use values ranged from 2.8 to 7.2 billion (1990) dollars (Carson *et al.*, 2003). On the other hand, a 'talking circle' (a traditional institution), was established with members of the Inuit communities (Centemeri, 2015; Picou, 2000). The talking circle was aimed at addressing the social and cultural impacts (shared instrumental and relational values) caused by the oil spill (i.e., decline in social relations, livelihoods, health; post-traumatic disorders) (Palinkas *et al.* 1993). Participants showed expressions of sorrow and apology for all beings affected by the disaster, developing cultural rituals aimed at healing intrinsic values of nature (Centemeri, 2015). Contingent valuation was instrumental in establishing compensation levels and seems to have influenced the reduction of large oil spills in the United States of America (Carson *et al.*, 2003). However, this method was not able to capture the worldviews and values of the Inuit communities concerned. For them the talking circle was a better way to express the diverse values involved (Centemeri, 2015).

To conclude, the choice of a valuation method is not neutral. Scholars in sustainability science have made a call to reflect on how valuation methods emphasize / exclude knowledge systems, worldviews and values emphasizing the sustainability and justice implications of such choices (Popa & Guillermin, 2015). This seems an important point for policymakers when commissioning valuation studies. Power issues implicit in valuation methods go beyond framing and may interact with other forms of power (see 2.4.1.4) as is the case when powerful actors influence the selection of representatives in participatory valuation approaches (Šunde *et al.*, 2018) or when facilitators may affect results by how they mediate between conflicting interests (Drennon & Cervero, 2002; Heron, 1999).

2.4.2.3 Values and decision-making

The problems we face for maintaining the values of nature/ nature´s contributions to people are the result of decisions that humans make (see Chapter 1). As we have seen, decisions are sometimes based on explicit valuation, sometimes the valuation is implicit or follow rules defined for the specific decision. This section is focused on what values dominate different types of decision-making and how this influences sustainability and justice outcomes.

As outlined in Section 2.4.1.3, values are often implicit in the rules (institutions) defined for specific types of decision-making and / or the role that individual or collective decision-makers operate under. Hence, there are rules for what a politician, chief executive officers of firms or community leaders are expected to do. These rules are defined to protect certain values underlying the kind of decisions involved. What values that are protected, vary across types of decision-making. Moreover, what power different decision-makers have that allows them to influence nature as well as the decisions of others vary (see 2.4.1.4). The aim of this section is to clarify key aspects of these complex issues. A more developed and thoroughly referenced analysis of the issues covered here is found in Annex 17.

Since we share natural environments, maintaining the values of nature and sustainable deliveries of nature's contributions to people demands coordinating actions at multiple geographical scales and across social groups. In principle, each single decision regarding nature influences the conditions and the values of nature for others. This is understood differently across the literature (e.g., concepts like external effects, side-effects, cost shifting) (Field, 2016; Kapp, 1971). However, all conceptualizations emphasize that what is best for the individual decision-maker – be it individuals, households or firms – may add up to intolerable situations for the collective. Moreover, actors may have an incentive to 'free-ride' since reducing negative side-effects of one's actions is costly, and the gains thereof are spread across all implicated actors. Even when actors have internalized values of care for nature, it may be demanding to know when one does something that is harmful and how to avoid the harm. Further, human interactions with nature

are mediated by power relations (see 2.4.1.4) implying both differentiated environmental responsibilities and distribution of environmental benefits and costs. Hence, ensuring conditions for collectively realizing the broad values of justice, sustainability and care is demanding.

2.4.2.3.1 Different values are underpinning different types of decision-making

So, what types of values are promoted under different contexts of decision-making? Building on the assessment-wide decision-making typology (see 1.2.3, Annex 1.3), it is possible to make some general assessments. This typology distinguishes between political, economic and socio-cultural decision-making. In parallel to that, a distinction is made between political and economic actors and civil society. Political actors have rule-making power and define the institutions – named resource regimes in **Figure 2.22** – under which economic actors operate. Political decisions are themselves governed by constitutional and collective choice rules also defined by political processes (Ostrom, 1990). Constitutional rules typically define broad values important for the society as well as basic rights of citizens including what powers policymakers have in relation to its citizens. Collective choice rules regard how political decisions should be made. The resource regimes offer economic actors the rights to manage, use and possibly trade resources from nature producing goods / income but also waste (operational power). That happens given the characteristics of these resources and existing technologies and infrastructures. Both political and economic decisions are to a larger or lesser extent embedded within the wider social and cultural context of civil society. Taken together, the institutional framing of specific economic, political decision-making and socio-cultural processes of relevance to the governance of human-human and human-nature relationships are termed governance frameworks. The different relations described above are captured in **Figure 2.22**.

Mainstream economics divides economic actors into producers and consumers. They are assumed to be self-interested, aimed at maximizing profits and utility respectively (e.g., Mankiw & Taylor, 2014). Notably, mainstream production and consumption theory emphasize values that can be traded in markets (i.e., foremost instrumental values that can be valued in monetary terms).

Understanding firms as profit-making entities is a highly relevant perspective. The rules established favours the values of owners. Still, the focus on profits is a more relevant description for corporations than for family firms, IPLCs and community-owned firms. Regarding the latter, broader quality of life considerations may also be important, such as landscape and community relational values (Burton, 2004; Gasson, 1973). This is not least an aspect featuring strongly in the literature on indigenous peoples and local communities (Dominguez *et al.*, 2012; Herrera-Cabrera *et al.*, 2018). At the same time, it is also observed that the more integrated such producers are into markets, the stronger role do instrumental values, as embedded in commodities, tend to play (e.g., Farfán-Heredia *et al.*, 2018) and cooperative structures may erode (Annex 2.11). Similarly, integration in international markets both increases the distance between actions and their effects on nature values between different social groups across geographical scales. Moreover, it breaks the links between local ecological capacities and the flow of matter across the globe following commodity chains raising a series of issues regarding which values become

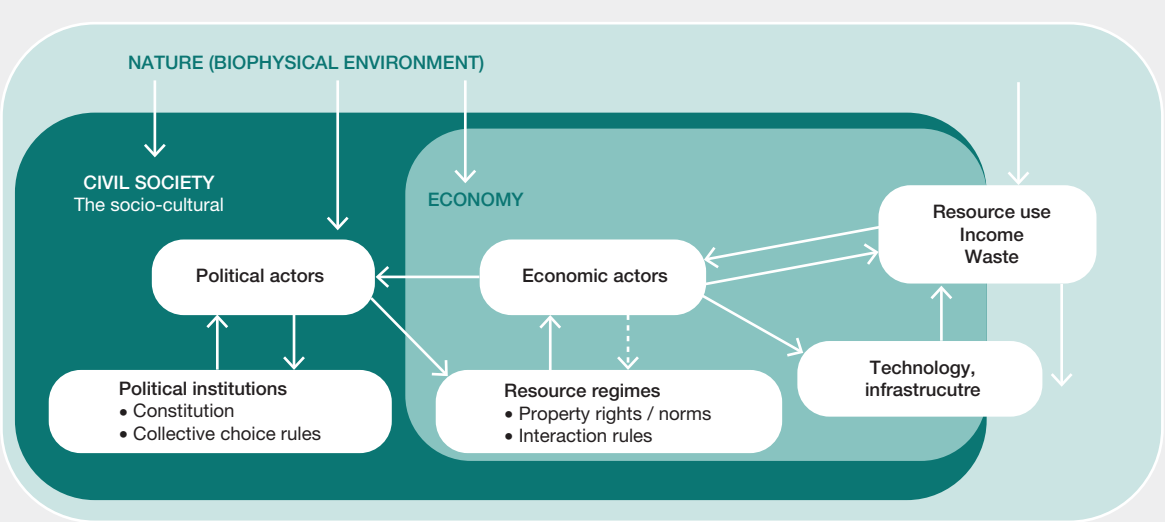

Figure 2 22 **Decision-makers and decisions in context. Source: Vatn (2021, translated).**

Box 2 11 Conflicting values expressed through the coal supply chain from Colombia to Türkiye.

Conflicting values at different geographical scales and across social groups can be identified in commodity chains. One approach to map the connections between nature´s contributions to people, stakeholders at different levels, value conflicts, justice issues and power dynamics affecting sustainability is through commodity chain analysis (Robbins, 2014). Such analyses cover the provision of natural resources, implied externalities like contamination, as well as the social dynamics crucial to understanding the socio-environmental conflicts and issues of distributive justice arising along these chains (Conde & Kallis, 2012) (see Chapter 1). For example, analysing the coal chain requires the identification both of its market and physical components (Wilde-Ramsing *et al.*, 2012) and the diverse and conflicting values involved in the socially and ecologically unequal exchanges between the countries involved (Cardoso, 2018; Ciccantell & Smith, 2009; Hornborg & Martinez-Alier, 2016; Talbot, 2002).

An analysis of the coal chain between Colombia and Türkiye shows that a growing industry implies increased socio-environmental impacts producing conflicts at various scales (Cardoso & Turhan, 2018) Conflicts between and within the countries and regions involved, arise from clashing worldviews regarding relations with nature / nature´s contributions to people as well as the unequal distribution of impacts along the chain (distributive justice). Concerns include reduced public health following air pollution and loss of identity and sense of place values associated with relocation and displacement of local communities. Additionally, there are concerns about the loss of intrinsic values due to ecosystem degradation (diversion of rivers and coastal ecosystems) and climate change. Decisions at one scale or one position in the chain percolates through the whole chain illustrating the political ecology of coal as a macro-level project of resource extraction and trade (Bebbington, 2015). The injustices produced may result in claims for compensation, remediation (retributive justice) and cessation (Zografos & Rodríguez, 2014). They may be expressed in plural valuation languages, besides economic compensation (Martínez-Alier, 2002).

The market only captures the monetary (instrumental) value of coal. Local indigenous and Afro-Colombian communities bear heavy social and environmental costs and associated value losses (Cardoso, 2015; Pérez-Rincón, 2014), and in Türkiye the combustion of coal affects the public health of communities in the areas surrounding the coal-fired power plants. In addition, the coal chain impacts climate, which itself affects intrinsic, relational and instrumental values across the planet in unequal ways (Richards & Boom, 2015). The multiple components of the coal chain and the lack of transparency throughout the system enable companies to disregard their socio-environmental harms (Harris *et al.*, 2016).

Grassroots movements across cultures and borders can be linked to better account for the plurality of values (costs and benefits) across the supply chain. However, how actors' valuation languages and their own worldview of coal and nature are defended and handled is affected by their power within the chain and their relationship with the territory where coal is extracted and burned (Cardoso, 2018). Assessing and comparing the coal chain from a value pluralist perspective enables better comprehension of the issues that underlie conflicts and may better embrace the valuation languages deployed by each actor, in each country and local territory.

prioritized. This is illustrated in **Box 2.11**. At the same time, a burgeoning literature on sustainable entrepreneurship / eco-social businesses indicates that it is possible to establish companies where values of nature are explicitly accounted for in the aims of the business (Johanisova & Fraňková, 2017; Muñoz & Cohen, 2018).

Also, consumers may act beyond self-interest and – to the extent affordable – "buy green". Still, that is a rather marginal phenomenon if we look at the entire market for goods and services (e.g., Vatn, 2015). Nevertheless, consumers may pressurize firms to act more environmentally friendly (Klooster, 2006; Skjærseth & Skodvin, 2001). Pressure from civil society through non-governmental organizations represents a similar trend (e.g., Pattberg, 2005). This has delegitimized the one-sided focus on monetary instrumental values by corporations, resulting in the concept of corporate social responsibility (CSR) to enhance business legitimacy. Taking the concept of social responsibility seriously may not imply loss of profits as civil society reactions are avoided (Gatti *et al.*, 2019; Walker & Wan, 2012). Still, the large literature on 'greenwashing' shows that genuine corporate protection of the diverse values of nature is more the exception than the rule (de Freitas Netto *et al.*, 2020; Delmas & Burbano, 2011; Pizzetti *et al.*, 2021).

Given these observations, it is not expected that economic actors can solve the challenges faced themselves. While they operate under resource regimes defined by political actors, it is, however, not a given that these actors are neither able nor willing to change the regimes in ways that favour the maintenance of the diverse values of nature. The literature is quite split on what motivates political actors. The public choice literature emphasizes that policymakers also act on self-interest (e.g., Dearlove, 1989). Other parts of the literature are more concerned with the specific characteristics of democratic governance, where a key aspect regards forming the role of the politician and the administrator as serving society (e.g., March & Olsen, 1995). While politicians are typically under strong influence

by powerful economic actors, this understanding opens space for changes in resource regimes making it possible to protect the nature's diverse values.

While policymaking has largely been seen as driven by interest and interest conflicts, it is also acknowledged that it is fundamentally about choosing the broad values on which societies should be based (Fukumoto & Bozeman, 2019; Stewart, 2009). This may happen through explicit decisions when making budgets and laws. It may, however, also be implicit in the designated mandates/responsibilities and rules defining what should be accounted for when ministries and agencies make their decisions (e.g., March & Olsen, 1995). Notably, these actors are formed around a key (and often conflicting) set of values, interests and knowledge (Movik & Stokke, 2015; Thomas, 1997). Moreover, it is important to note that general economic policies are as important for the capacity to maintain the diverse values of nature as the more specific policies for protecting them (see 2.4.2.3.2).

Figure 2.22 emphasizes that both political and economic decision-making is embedded in civil society. Certainly, by making markets the dominant institution for resource allocation, the link between civil society and economic action is weakened, and many civil society actors may align with the value prioritization of economic actors (e.g., some social media) (Stutzer *et al.*, 2021). As emphasized above, civil society forces – especially through the activity of social movements and NGOs – nevertheless impact upon economic and political decision-making by advocating the acknowledgement of nature's diverse values. First, civil society and socio-cultural processes form the value base of societies and political action would – at least in democracies – reflect that (e.g., Schill *et al.*, 2019). Second, socio-cultural actions are broad in their focus, with emphasis not only on instrumental values, but also on relational and intrinsic values (Chan *et al.*, 2016; Comberti *et al.*, 2015) (see 2.2). It reflects the experiences of people as they encounter each other and nature and is the case whether we talk of industrialized societies or indigenous peoples and local communities. Certainly, sustainable human-nature relationships may feature less prominently in the former case (Dawson *et al.*, 2021). The role that civil society can play *vis a vis* political and economic decision-making is moreover influenced by the respect given to human and civil rights (Ahmad, 2018; Deva & Birchall, 2020).

2.4.2.3.2 The conflict between values in policymaking

As noted, the role of policymakers is to prioritize between values when they decide on the more formal institutions of a society. The period after World War II has been characterized by strong economic growth, measured with gross domestic product, a monetary instrumental value indicator (Steffen *et al.*, 2015). Economic growth became a key political goal – reaching the status of a broad value – in many countries from around 1950 and onwards, and gross domestic product became the main measure of success underpinning many policies **(Box 2.7)** (Coyle, 2014; Purdey, 2009; Schmelzer, 2015). Liberalizing markets and ensuring stable currencies were important institutional aspects fostering its realization (Steil, 2013). Except for a short period in the 1970s (Gómez-Baggethun & Naredo, 2015), there has been no serious emphasis on the conflict between economic growth and maintaining the diverse values of nature. Rather a win-win discourse prevailed (Otero *et al.*, 2020).

Research shows that increased global gross domestic product drives increased use of natural resources (Krausmann, 2017). In recent periods, even a 1:1 relationship is observed (Hickel & Kallis, 2020). Such extractive policies have created immediate loss of multiple nature values at different geographical and social scales, disproportionately affecting indigenous and local communities (Temper *et al.*, 2018). The Niyamgiri case **(Box 2.12)** illustrates the power issues and value conflicts between economic development projects and indigenous peoples and local communities. Over time, effects have also become global and threaten the functioning of the whole earth system by crossing key planetary boundaries (Steffen *et al.*, 2015). Certainly, due to a loss of nature's values following this development, international treaties and national policies – e.g., regulations and price incentives – have been instituted in an attempt to overcome the various types of free-rider and power issues involved (Chasek & Downie, 2020). However, the field of environmental policy is more characterized by failure than success (e.g., biodiversity loss and climate change) (IPBES, 2019a; IPCC, 2021).

There are several reasons for this. Environmental regulations generally do not engage with the drivers. They rather focus on effects (IPBES, 2019a). The institutions established to foster market expansion, international trade and economic expansion are generally left unchanged or even strengthened. Policies for economic growth are often put in place as if they will not create serious threats to nature values. When such problems are encountered, regulations may be put in place to reduce negative impacts on these values (e.g., Vatn, 2015). There are several serious issues encountered when using such a 'grow first – regulate afterwards' strategy. It produces interests that typically act against policies that are later proposed to protect the natural values involved (Union of Concerned Scientists, 2007). Moreover, in a natural world of tipping points, the delays caused by such a strategy are highly problematic. Creating institutions that integrate economic and environmental policies to protect sustainability and justice values, that focus up-front on avoiding serious future impacts on nature and nature's contributions to people and make people less dependent on economic expansion, especially in rich countries, may be important strategies to handle the challenges humanity faces.

Box 2 12 Conflicting values, power and justice in decision-making about mining: Niyamgiri mountain.

The socio-environmental conflict that emerged due to mining near Niyamgiri mountain (Odisha, India), which is conceived as sacred by local indigenous peoples (Temper, 2019), elucidates the role of worldviews, values, power and justice in decision-making. It also illustrates how political actors who define the rules for resource use often also define relevant forms of valuation.

In 2003, the mining company Vedanta Resources received approval to build a refinery (which did not require forest clearance). In 2004, Vedanta then requested approval to clear forest for a mine, citing the existence of the refinery as rationale. Niyamgiri provides habitat for diverse species and supports livelihoods for the Dongria Kondh and Kutia Kondh indigenous peoples, who regard Niyamgiri as sacred and see their survival as dependent on its ecosystem's integrity (Temper, 2019).

In 2004 environmentalists petitioned the Indian Supreme court to not allow the mine permit (CEC, 2005; Sahu, 2008). For nuanced reasons (Annex 2.5), the court approved the mine and associated forest clearance. This verdict resulted in mass-scale demonstrations. In 2013, India's Supreme court reversed the earlier decision, ordering that the Dongria Kondh's right to worship their sacred mountain must be "protected and preserved" and that those with religious and cultural values associated with the area must be included in the decision-making process. It allowed the affected tribal villages to decide on the project via local referenda (Tatpati *et al.*, 2016; Temper & Martinez-Alier, 2013). The affected villages held referenda and unanimously rejected the mining project. In 2014, the Ministry of Environment, Forest and Climate Change upheld the decision to disallow forest clearance.

The case includes a range of valuation approaches: the firm's bottom-line considerations, cost-benefit analysis (focusing on instrumental values), portrayals of ecological (intrinsic) values, and evidence of (relational) cultural values of indigenous peoples. In this case, the power to make decisions influence which values were prioritized and which valuation methods were deemed appropriate.

The case also exemplifies how different valuation logics succeed or fail in representing different life frames and sets of values. The first court decision was largely based upon prioritising economic development (living from frame), emphasizing industrialization (Lele, 2012). Cost-benefit analysis, which focused on instrumental values (e.g., employment income; infrastructure expenses, profits) and thus supported Vedanta's interests, was central to this decision (Padel & Das, 2010). Yet conservation activists (who largely aligned with a living with frame) conducted an alternate cost-benefit analysis and submitted it to the court; this cost-benefit analysis was associated with biophysical evaluation (e.g., evidence of rare species) and represented the project's biophysical externalities (CEC, 2005). These same activists also submitted a writ petition that emphasized the intersections between cultural and biodiversity values and the rights of local communities to define their livelihoods (Supreme Court of India, 1995). They highlighted a relational worldview (living as and living in frames). The latter two ways of approaching the issue intertwined, as both incorporated an intact Niyamgiri ecosystem as a core value. Yet cost-benefit analysis, even when employed by conservationists and including extensive analysis of the biophysical impacts of the mining operation, was unable to represent the cultural, spiritual and territorial values that were most important to local indigenous people (Temper & Martinez-Alier, 2013).

2.5 VALUES FORMATION AND CHANGE AS DYNAMIC PROCESSES

Environmental policies often seek to directly or indirectly create or modify values. For example, almost all national biodiversity strategies and action plans promote greater awareness and concern for biodiversity (see 2.1.2, Annex 2.2). Decision-makers thus need to understand value formation and change processes to effectively and ethically engage them in policymaking, including anticipating their relative stability/malleability in the face of specific policies (see 1.3). Here, scoping and systematic literature reviews (Pham *et al.*, 2014) were used to explore how values form and change as individual, social and socio-ecological processes (Kendal & Raymond, 2019) that depend on value type (e.g., broad versus specific), context (e.g., institutional setting) and scale (e.g., spatial and temporal) (Horlings, 2015) (Annex 2.16, **Figure 2.23**). These processes can operate simultaneously and can feedback to value expression (see 2.4). This subsection spotlights particular concepts to facilitate reflexive decision-making that better tailors policies for desired outcomes.

2.5.1 Individual, social and socio-ecological processes of value formation and change

Diverse concepts from multiple academic and non-academic traditions relate to value formation and change **(Table 2.6)**. 'Value formation' refers to how values develop in the first place. 'Value change' describes the modification of broad values or altering the prioritization of specific values in individuals or social groups. Though these are fundamentally related processes, values formation

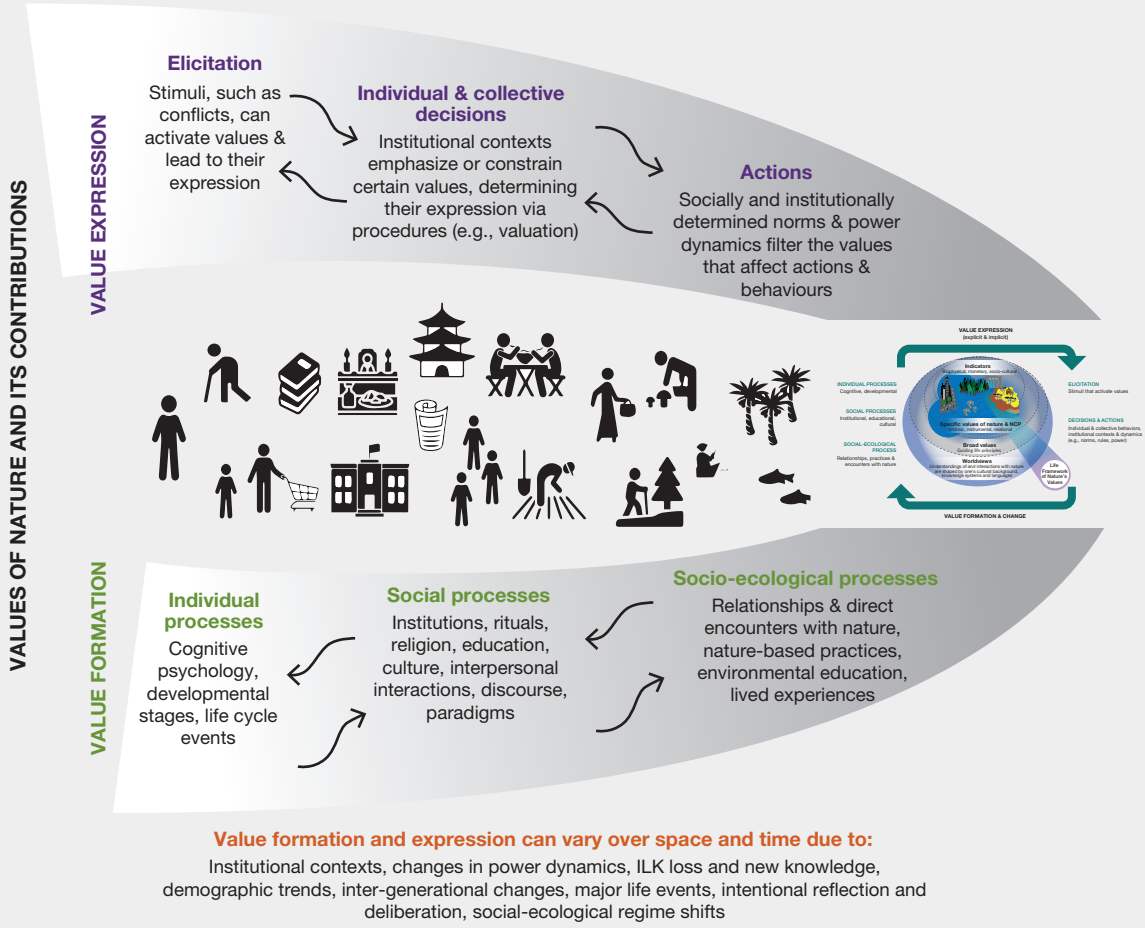

Figure 2 23 **Understanding value formation and change as part of a dynamic process provides various 'entry points' for decision-makers to tailor policies toward specific levels (e.g., individual, social and socio-ecological) in light of desired outcomes of value expression (e.g., actions, decisions, see section 2.4).**

scholarship rarely considers what was there before (e.g., Schwartz, 1992), whereas values change studies mostly focus on shifts in sets of values or the organization of values hierarchies over time (e.g., within an individual's life, between generations) (Kendal & Raymond, 2019; Manfredo *et al.*, 2017).

A critical insight for policy-making is to recognize the pivotal role of social dynamics (e.g., gender roles) and social context (e.g., institutions through which decisions are made) of values formation / change whereby collective meaning is constructed regarding what is good or bad and right or wrong within specific situations over time (Bourdieu, 1990; Cooper *et al.*, 2016; Dumont, 1980, 1986; Graeber, 2001; Hitlin & Piliavin, 2004; Levi-Strauss, 1973). This constructivist perspective applies explicitly to social and socio-ecological processes and implicitly to some aspects of individual processes. For example, while a child's individual cognitive development may underlie her value formation process (Gilligan, 1993), she is also infused by social dynamics and is always a member of many communities (Bardi *et al.*, 2009; Norton, 2005). As such, values are embedded in social dynamics and institutions like gender roles and rituals (see 2.4.1) that emphasize what is expected to be important. Therefore, these social contexts can promote, activate or hinder certain values at both individual and societal levels (Amel *et al.*, 2017).

Consequently, policy-settings constitute an important arena whereby individual, social and socio-ecological processes combine (e.g., collective discussion, deliberation) regarding what matters via decision-making. These processes also interrelate in forming shared values (Irvine *et al.*, 2016) **(Box 2.9)**. On the one hand, broad values like justice or responsibility can form due to social dynamics (e.g., family roles, intergenerational exchange) or become embedded in and perpetuated by institutional contexts (e.g., norms, rules) (Aldridge, 2007; Dewey,

Table 2 6 **Summary of key concepts detected in the literature from diverse academic and cultural traditions to explain value formation and change.**

Concepts (bolded in text below) are organized by their focus as (i) individual, (ii) social or (iii) socio-ecological. These are not mutually exclusive categories and may operate simultaneously (see Annex 2.16).

Focus	Key concepts related to value formation and change	Examples
Individual-focused processes	**Human biology: Biological perspectives** link values formation and change to human evolutionary history and the need for nature for survival.	The biophilia hypothesis explains human affinity for nature as part of our species' evolutionary history and as a basic biological trait.
	Cognition: While the individual is never entirely isolated from a broader context of culture and environment, **cognitive and developmental psychology** highlights commonalities of how human minds develop broad values and moral judgements, but does not emphasize values change.	Young children do not consciously apply values-thinking to problems, but through their cognitive development (connected with social processes) later begin to form values that they then apply into decisions.
	Life cycle: Psychology has also shown that formative **life cycle stages** influence the formation of broad values. After maturation, modification is still feasible, even if more difficult, via social and socio-ecological processes.	Having children can shift people's values to become more focused on the nuclear family, but concomitantly more concerned about the future.
Socially- oriented processes	**Social dynamics:** Values are seen to arise from **social processes**. Individuals **internalise** values through **socialisation** processes.	Reward / punishment dynamics from parents and elders teaches a child what is right or wrong, some of which is incorporated into how he thinks and behaves based on these values.
	Institutions: Values are embedded in institutions, and therefore changes to **institutional contexts** (e.g., increased exposure to markets or a new religion) can influence the relative importance of values and those that become dominant.	After a natural disaster, such as a tsunami, the choice of policies applied to the recovery plan can shape and modify pre-existing values, such as promoting individualism over communalism by changing financial incentives.
	Deliberation: Shared values can form through deliberative social processes, such as **collective decision-making**. Plural-value-articulating institutions can help legitimately form **shared values**, while navigating conflicts between different values and value types.	Participatory engagement like councils, public debates, story-telling, ethnographies and audiovisual materials can help stakeholders identify and create common values and interests regarding environmental agenda-setting and management implementation (e.g. fisheries) (see 4.6.6, **Box 2.8**).
	Intra- & inter-generational social change: Demographic changes (e.g., immigration, emigration) that affect social composition can change values due to the aggregation (or removal) of new individuals into group dynamics. Inter-generational change in values also can occur due to major demographic shifts over time, but these are not changes in the individuals' values, rather the aggregate of social groups.	Indigenous communities around the world report that youth migration to urban areas in search of employment leads to drastic value change, and that children who were born and raised in urban areas often cannot learn about and engage with their community's traditional livelihoods. Such lack of exposure to everyday practices, places and language contributes to intergenerational value erosion.
Socio-ecological processes	**Human-nature interactions:** Socio-cultural values are frequently shown to arise from encounters at the **confluence of social factors** (e.g., demographics, socio-political context) and **biophysical conditions** (e.g., landscape features, ecosystem health).	Many socio-ecological interactions like fishing, animal husbandry, logging or hunting are not only drivers of environmental degradation (when they are unsustainably practiced), but they are also human-nature relationships that produce diverse knowledges and values about nature and nature's contributions to people.
	Relationships: The relational values concept recognises that values form from **connections and bonds** between people with biodiversity and ecosystems or between people and place.	The Quechua concept *Sumak Kawsay* (*Buen vivir* or good living) encompasses meaningful holistic relationships among humans and more-than-human nature and a variety of relational values (e.g., balance, reciprocity).
	Interconnectedness and interdependence: The culturally-specific concept of **being/living in an interconnected world** and values related to well-being.	Values related to interdependence with nature are formed in many cultural manifestations, such as the Japanese concept and practice of *shinrin-yoku* (forest bathing) and sayings, such as *"we take care of the land, and the land takes care of us."*
	Embeddedness: Some humanities approaches (e.g., phenomenology) highlight how people are **embedded** in and emotionally tuned to meaningful relationships with and within the world.	Cultural and artistic practices often express and create embeddedness. Hawaiian hula and north-western North American totem poles, for instance, both express and produce natures infused with meaning, including values.
	Environmental education and literacy: Formal and informal **environmental education** often involves interaction with ecological systems; this interaction can facilitate experience-based knowledge acquisition and also associated values.	Environmental education (e.g., formal or informal programs that guide people to understand more about their surroundings) can increase connectedness to nature, sense of place, and relational values. In many communities, environmental education occurs iteratively through joint participation in activities such as farming, foraging or land management.
	Socio-ecological change: Generally, broad values are considered to be rather stable unless major shifts occur in the life of an individual or society. In particular, **shifting baselines and major societal or ecological transformations** have the potential to affect values. An important knowledge gap exists as to whether sudden environmental or social changes (e.g., pandemics, floods, wildfire) lead to long-term shifts in individual and societal values.	The COVID-19 pandemic has led many people to resignify the importance of nature as a place of respite and a source of mental health, at least in the short-term. Over longer periods of time, shifting baselines can also produce 'environmental generational amnesia' and 'ecological grief, associated with the loss of values as a result of loss of encounters with nature or particular features (species, ecosystems).

1922; Habermas, 1991; Saroglou *et al.*, 2004; Schwartz & Huismans, 1995) (Annex 2.3, **Box 2.2**). Subsequently, individuals may adhere to these values in different ways and to different degrees. What is considered individual value formation, therefore, may actually be the expression of shared values at the individual level. Policies can engage with values formation at the individual level via internalized (or rejected) through socialization (e.g., by exposure to new belief systems, religions or markets that impact the values that individuals either hold or express) (Hwang & Bowles, 2011) (Annex 2.3). At the same time, feedback from ecosystems often informs social value processes (i.e., information from and about nature is used as a primary input) (Berkes, 2008; Bieling *et al.*, 2014; Rappaport, 1979; Satz *et al.*, 2013).

Finally, this socio-constructivist perspective helps interpret value stability. Stability depends largely upon the type and dimension of value being considered. A broad value may remain constant in the individual after formative life stages or within social groups in a given place or time due to stable social dynamics and contexts. However, specific values have numerous mediating factors that affect the final expression of a particular principle or preference in a given situation. Nonetheless, even broad values can shift in the face of significant life events or changing socio-ecological contexts, but this topic requires further research (see **Boxes 2.13** and **2.14**).

2.5.2 Combining value formation and change processes to enhance policymaking

Value formation and change are dynamic processes with multiple components and mechanisms that allow policy engagement. An important insight for decision-makers is that targeting value-related outcomes (e.g., pro-environmental behaviour) (see 2.4.1) can be achieved by forming and changing values (e.g., via environmental education) (see Annex 2.16), but also attention to institutional structures and decision-making contexts that can activate or hinder existing values (see 2.4.2). Based on this assessment, policies oriented towards value formation and change can consider the following topics to be more rigorous, effective and inclusive:

- Relatively stable broad values can adapt at certain points in the life cycle. Shifts can occur when (i) major life events like parenthood or maturation (Kendal & Raymond, 2019; Milfont *et al.*, 2016), (ii) people's values are seriously challenged (Bardi & Goodwin, 2011), (iii) one's life is threatened (Gailliot *et al.*, 2008; Greyson, 1983, 1993; Joireman & Duell, 2005) or (iv) one encounters significant life changes (e.g., migration, Lönnqvist *et al.*, 2011);

- Engaging value formation and change is an inherently ethical issue. It is important to not only 'change' others values, but also avoid altering desirable cultural expressions (institutions, languages, knowledges) that protect nature's values (see 2.2.1, 2.2.2, Annex 2.1)[44]. Consequently, policy instruments can acknowledge and engage with other knowledge and value systems (e.g., epistemic and recognitional justice). Doing so would help prevent inappropriate value impositions or manipulations (e.g., Heberlein, 2012);

- Likewise, it can be both more ethical and effective to concentrate policy on building upon existing value structures and encouraging collective reflection to promote desirable attitudes, norms and behaviours (Manfredo *et al.*, 2017). For example, rather than calls to transform established religious traditions (White, 1967), it can be more appropriate to reinforce values shared by world religions (e.g., reverence, respect, restraint, reciprocity, redistribution, responsibility and renewal) (Grim & Tucker, 2014). Facilitating intentionality and self-reflection (e.g., via deliberation) within decision-making can aid individuals and social groups to activate or reprioritise values that are needed for sustainability solutions (Raymond & Raymond, 2019).

- Desired specific values can be formed, but also activated or prioritised (see objective 20 from the working document of the targets of the post-2020 global biodiversity framework proposes: *Foster diverse visions of a good quality of life and unleash values of responsibility, to effect by 2030 new social norms for sustainability)* by (1) supporting or creating arenas where stakeholders can communicate about value priorities in their societies; (2) strengthening educational programs and language revitalization efforts, spreading knowledge and fostering reflection over societal values; and (3) changing the institutional contexts under which decisions are made –both at individual and socio-political levels– to shift what values get emphasized (Bowles, 1998; Dewey, 1922; Habermas, 1991).

- Long-term change of broad values occurs slowly, even over generations, but can also occur when: (i) major life transitions involve multiple alterations (e.g., natural disasters, urbanization), or; (ii) there are significant alterations in the socio-ecological context (e.g., society's evolving values regarding environmental conservation) (Manfredo *et al.*, 2017, 2020). There is a need for new knowledge directed at understanding better how values change in the face of socio-ecological regime shifts, such as amidst the risks and uncertainties of natural

44. Systematic review of indigenous and local knowledge and philosophies (https://doi.org/10.5281/zenodo.4396278).

or human-made catastrophes and hazards (Kendal & Raymond, 2019) (see **Box 2.14**).

While broad values generally form in childhood or early adulthood and remain relatively stable across one's lifetime (Dietz *et al.*, 2005; Rokeach, 1973), at the societal level, broad and specific values may shift due to long-term changes in the ways people relate to the natural world (Greenfield, 2009) or based on shifting group composition (i.e., the socio-demographic structure of societal groupings). In response to these altered social contexts, an individual's values can be activated (Maio *et al.*, 2009). For example, economic incentives and other institutional structures can modify how an individual or group attributes importance to nature (Dixon & Pagiola, 2001). In sub-Saharan Africa, some studies show that nature was more valued in formal land-use decisions when it was linked with tourism and international monetary transfers for conservation that benefited local communities (Barnes

Box 2 13 Human-nature interactions and value formation and change: Leopold's wolf encounter.

Aldo Leopold (USA, 1887-1948), considered a founder of ecology and environmental ethics, exemplifies how the senses, sciences and arts can be fused in activating, forming and changing values. In *A Sand County Almanac* (Leopold, 2013), Leopold advanced what he called the 'land ethic', arguing, *"that the individual is a member of a community of interdependent parts"*, adding that humans gradually broadened their moral concern to larger communities through *"a process in ecological evolution"* (Leopold, 2013, p. 171). Leopold then reasoned that moral concern ought to be extended *"to include soils, waters, plants, and animals, or collectively: the land"* (Leopold, 2013, p. 172), which would mean an environmental decision *"is right when it tends to preserve the biotic community. It is wrong when it tends otherwise"* (Leopold, 2013, p. 188).

Leopold acknowledged that Darwin influenced his understanding that we *"are only fellow-voyagers with other creatures in the odyssey of evolution"*. This realization can lead us to *"a sense of kinship with fellow-creatures; a wish to live and let live; a sense of wonder over the magnitude and duration of the biotic enterprise"* (Leopold, 2013, p. 97). Leopold did not, however, arrive at his ethics exclusively through science. His perspective was kindled by a personal, sensory, eye-to-eye encounter with a wolf. As a 22-year-old forester, Leopold was hired to survey public lands in New Mexico. In *Thinking like a mountain*, he recalled the day he and a co-worker had the now-famous wolf encounter:

> *"We were eating lunch on a high rimrock, at the foot of which a turbulent river elbowed its way. We saw what we thought was a doe fording the torrent, her breast awash in white water. When she climbed the bank toward us and shook out her tail, we realised our error: it was a wolf. A half-dozen others, evidently grown pups, sprang from the willows and all joined in a welcoming mêlée of wagging tails and playful maulings. What was literally a pile of wolves writhed and tumbled in the center of an open flat at the foot of our rimrock.*
>
> *In those days we had never heard of passing up a chance to kill a wolf. In a second we were pumping lead into the pack, but with more excitement than accuracy; how to aim a steep downhill shot is always confusing. When our rifles were empty, the old wolf was down, and a pup was dragging a leg into impassable side-rocks.*
>
> *We reached the old wolf in time to watch the green fire dying in her eyes. I realised then, and have known ever since, that there was something new to me in those eyes—something known only to her and to the mountain. I was young then, and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view"* (Leopold, 2013, pp. 114-115).

Seeing the *"green fire"* die in the wolf's eyes did not suddenly lead Leopold to value predators. Nor did it alone precipitate his land ethic. Indeed, for years, Leopold embraced government efforts to exterminate wolves and mountain lions from North American wildlands to increase the availability of deer and elk for hunters. Rather, the wolf haunted Leopold. She became his muse. Eventually, when combined with Leopold's growing ecological understanding, this emotionally-wrenching experience helped him to understand the socio-ecological importance of predators to flourishing ecosystems. Decades later, he came to see the effects of deer and elk overpopulation on vegetation and soil erosion. The experience also led to regret, contributed to his feelings of kinship with other organisms and perceptions that we have ethical obligations to the entire community of life.

Leopold was aware that people from diverse times, places and cultures have had such feelings. But as a man whose professional life spanned the first half of the 20th century, he was keenly aware that such broad values were not prevalent in his country's decision-making. Indeed, Leopold recognised that too often *"we abuse land because we regard it as a commodity belonging to us"* (Leopold, 2013, p. 4). Through the art-craft of writing –telling stories about his own, emotionally-moving experiences, and describing the wonders and beauties of nature both aesthetically and scientifically– Leopold sought to awaken humankind's ability to care, because, *"when we see land as a community to which we belong, we may begin to use it with love"* (Leopold, 2013, p. 4).

Box 2 14 Values involved in the risks and uncertainty of catastrophic events.

Research indicates an increased frequency and severity of natural and human-made hazards, particularly those driven by climate change (Coronese *et al.*, 2019; IPCC, 2012; UNDRR & ISC, 2020). Consequently, policy-makers from defence, economy, environment, health and transportation sectors are searching for ways to manage the risk and uncertainty associated with these catastrophic events (e.g., Asian Development Bank: Thomas & López, 2015; IUCN: Monty *et al.*, 2016; insurance industry: Hoeppe, 2016). Nature-based solutions (e.g., supporting ecosystem-based disaster risk reduction) harness the ability of biodiversity and ecosystems to provide multiple contributions to people across development sectors, ranging from infrastructure and territorial planning to health and business (WHO: Wisner *et al.*, 2002, IUCN: Monty *et al.*, 2017). These policies not only improve biophysical measures of nature, such as hectares of mangroves, but also indicators of human well-being related to economics like reduced cost of road construction and maintenance and health outcomes like fewer lives lost. Valuation efforts have been made to estimate market and non-market values of the social, economic and health costs of natural disasters and the benefits derived from mitigation investments; these studies indicate that even when cost-benefit analyses are not feasible, due to insufficient information or incommensurable values (e.g., mental health, cultural heritage), it is prudent to account for diverse values when prioritizing decisions or use non-economic methods, such as consultative or deliberative processes (Rogers *et al.*, 2019).

Decision-making regarding natural hazard risk management is a complex process integrating multiple 'facts' and 'values' in the assessment of both the disaster's effects and its underlying causes (Aven, 2016). Consequently, effective natural-disaster preparedness accounts for nature's instrumental (e.g., crops, timber), intrinsic (e.g., species, ecosystems) and relational (human health, sense of place, recreation) values (ECLAC, 2003; Graham *et al.*, 2013). Furthermore, certain social groups are more vulnerable to such catastrophes, as in the case of women having a lower life expectancy than men in response to natural disasters due to their socio-economic status, rather than biological or physiological reasons, (Neumayer & Plümper, 2007). Scholarship has shown that integration of ILK (Kuruppu, 2009; Rai & Khawas, 2019), attention to cultural values (Jogia *et al.*, 2013) and consideration of social institutions (e.g., religion, Hiwasaki *et al.*, 2014) are not only requisite to achieve equity and inclusion, but also ensure community preparedness and resilience, resulting in improved conditions for recovery.

As socio-ecological processes, catastrophic events make nature's diverse values more evident. For example, in the face of the COVID-19 pandemic, the concept of 'one health' has led policymakers to reconsider the value of the link between human and environmental health (Rampa, 2020; UNEP & IRLI, 2020). Such 'encounters' also demonstrate that: (i) the acknowledgement of diverse values is necessary to respond effectively to socio-ecological risks and uncertainty, and (ii) the solutions employed to mitigate or recover from such crises can themselves modify social values (Ramanujam *et al.*, 2012). These insights can be applied to other policy challenges where wholescale socio-ecological regime shifts occur at slower time scales, such as the land use transformations involved in dams, monoculture plantations and urbanization. However, more research is needed to better anticipate not just the values at stake in the face of extreme events, but also how these disturbances can change values in the long-term like placing greater importance on green infrastructure. In particular, it is clear also that the policies and structures created to manage these phenomena themselves are value articulating institutions that will express and also form values into the future (see 2.4.1; see also Ford *et al.*, 2019).

et al., 2002) or the state (Amin, 2016). However, integration into global markets and other economic institutions can also erode local values and institutions (Al-Ubaydli *et al.*, 2013; Bowles, 1998; Macy & Sato, 2002) (see 2.3.2.3).

- Inter-generational time scales are important policy considerations, not only to change values, but also maintain them (Manfredo *et al.*, 2017). For example, broader socio-cultural change (e.g., migration, educational attainment) can weaken knowledge transmission and value formation from older to younger generations (Tefft, 1968; Traub & Dodder, 1988) or decrease resilience to new value systems (e.g., assimilation) (Bruner, 1956). Plus, "shifting baseline syndrome" (i.e., becoming accustomed to a degraded world) has been shown to affect younger people's knowledge and perceptions of nature, which may ultimately determine their attitudes and values (a phenomenon known as 'generational amnesia') (Jones *et al.*, 2020). The issue of inter-generational value changes is particularly evident in the loss of ILK and associated values, as well as erosion of nature knowledge or ecoliteracy connected to biodiversity loss (see 2.2.2) (Berkes, 2008; Genovart *et al.*, 2013; Pilgrim *et al.*, 2007; Schwann, 2018).

2.6 CONCLUSIONS REGARDING THE MULTIPLE CONCEPTUALIZATIONS OF NATURE'S DIVERSE VALUES

Based on three stages of literature review and ILK dialogues and submissions, Chapter 2 authors characterized and assessed different conceptualizations of nature, nature's contributions to people and human-nature relationships and how these diverse ways of understanding affect peoples' attitudes, behaviour and decisions. This process brought to light knowledge and capacity gaps (**Box 2.15**, see Chapter 6). To conclude, the chapter's findings are brought into perspective as insights to the IPBES conceptual framework (IPBES 2/4) (see 2.6.1), to the science-policy interface (see 2.6.2) and to this assessment's subsequent chapters (see 2.6.3).

2.6.1 Relevance for the IPBES conceptual framework

Chapter 2's main concepts and their interrelations are visualized in **Figure 2.24**; red numbers refer to pathways that complement and enhance the IPBES conceptual framework (Díaz *et al.*, 2015; IPBES-2/4).

1. In the context of previous IPBES assessments, **'nature'** refers to the *"nonhuman world, including co-produced features, with particular emphasis on living organisms, their diversity, their interactions among themselves and with their environment"* (IPBES, 2019b) **However, the concept of nature itself varies among cultures, knowledge systems and traditions.** Within the context of predominant environmental science and policy perspectives, nature is often conceived in terms of biodiversity, ecosystems, evolution, the biosphere, humankind's shared evolutionary heritage, and biocultural diversity. Within the context of other knowledge systems, however, it includes more holistic, relational concepts such as Mother Earth and systems of life. Indeed, in the worldviews and / or languages of many sociocultural groups (both IPLCs and others), there is no separation between humans and nature, but rather a context-specific understanding of the symbolic, spiritual and physical connectedness between people and places (see Chapter 1, 2.2.2, 2.2.3, Annex 2.8).

2. Different **worldviews shape one's adoption of broad values with regard to nature and a good quality of life.** Worldviews are forged through the dynamic interplay between individuals, social groups, and place, in both biophysical and built environments (see 2.2.1). Multiple factors shape worldviews including knowledge systems, languages and religion. Worldviews can also be shaped or modified through cultural encounters, such as in human displacement and migrations, as well as through coping with natural and human-made disasters **(Box 2.14)**. Different types of worldviews are recognized in the literature including anthropocentric, bio- and eco-centric, and pluricentric. Philosophies of good living held by many indigenous peoples and local communities and other human groups promote and embody diverse broad values between humans and between humans and nature, including reciprocity, responsibility, place-based identities, kinship with nature and self-determination. Some of these values have been articulated in different policies and governance systems from local to global scales (see **Box 2.4**)[45].

3. IPBES' conceptual framework focuses attention on institutions and governance systems as underlying causes of environmental change that are exogenous to the ecosystem in question. This chapter reinforces this conceptualisation by recognising that **institutions** (e.g., conventions, norms and legal rules) **shape and are shaped by worldviews and broad values.** These processes are both formal and informal and influenced by existing power structures. For example, different understandings of fairness, equity and responsibility will shape different systems of property rights, economic policy, legislative arrangements, norms and conventions, which significantly influence how people make decisions and act in relation to nature. Thus, through worldviews and institutions, broad values shape direct **anthropogenic drivers** affecting nature.

4. The IPBES conceptual framework and *global assessment* discuss the importance of harnessing values for sustainability. This chapter reveals the complexity associated with changing values to achieve just and sustainable futures, providing conceptual clarity to support the other chapters, as well as policy options. **Values can change slowly or quickly, depending on the value dimension at play and the broader socio-institutional context (4).** Broad values typically form in childhood and early adulthood (see 2.5.1) but can be modified subsequently based on major life changes or through deliberative processes (see 2.5.2). Specific values (i.e., instrumental, intrinsic and relational values) are more malleable and also overlapping; they often depend upon context-specific situations, including institutions that are amenable to policy interventions (Annex 2.16; see 2.5.2). Pathways of formation and change vary according to social dynamics and socio-ecological settings. For example, specific values as expressed in political, economic and socio-

45. Literature review for the philosophies of good living (https://doi.org/10.5281/zenodo.4399544)

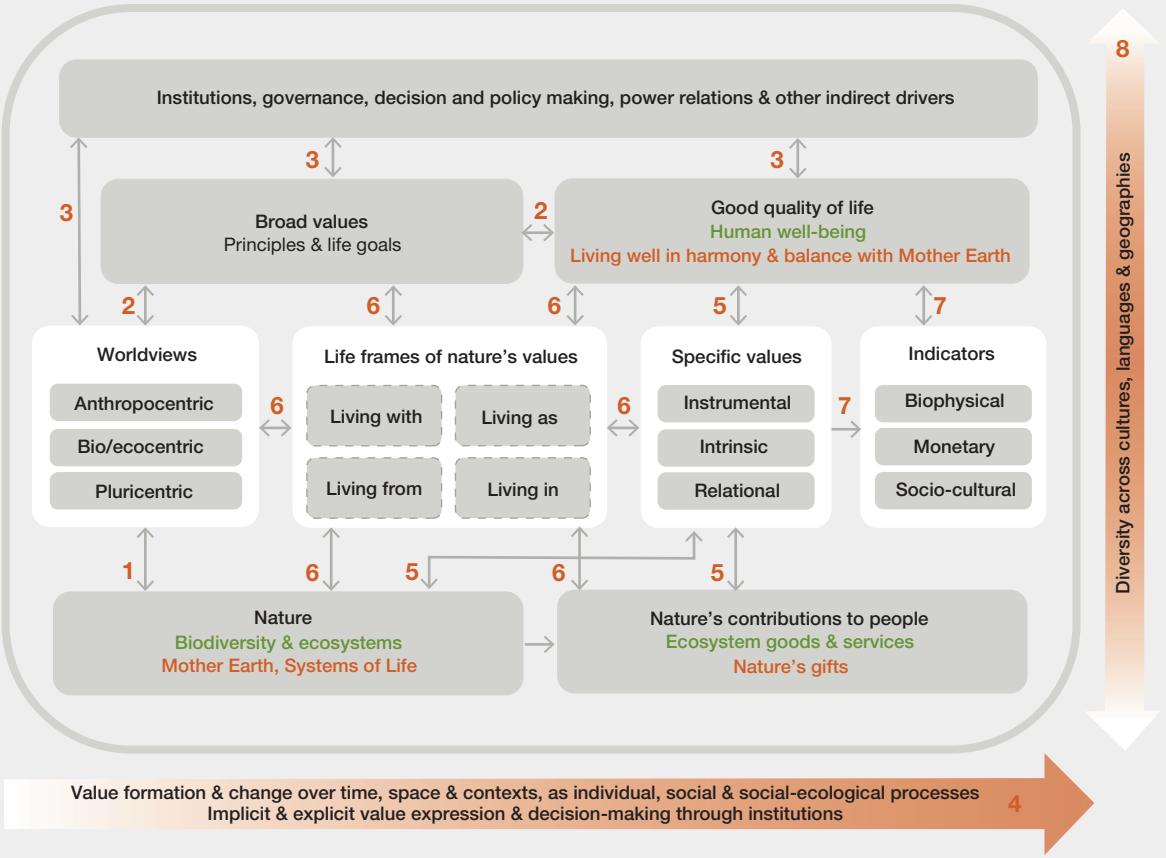

Figure 2 24 **Summary of the main conclusions derived from the assessment in Chapter 2.**
Red numbers indicate places where the chapter's work complements or enhances the IPBES conceptual framework. Descriptions of each are provided in the text.

environmental decision-making can obstruct changes in broad values. Similarly, how values are expressed can be affected by valuation approaches used and power dynamics. Changing the institutional contexts under which decisions are made (e.g., whether they emphasize individual or collective interests, economic growth or broader notions of well-being) help shift what values get emphasized (see 2.4.2, 2.5.2).

a. The **change in institutions over time** corresponds with changes in and formation of broad values (horizontal orange arrow) through a dynamic relationship. Value expressions, including behaviour and actions, are mediated by power relations and manifest in institutions affecting which values are prioritized in decision-making, as well as how values are formed and activated. Institutions influence decision-making in different ways. They define who has the power to influence or make certain decisions and on the basis of what values and knowledge (see 2.4.1.4). They influence how / which values can be expressed in decision-making (see 2.4.2.1). The methods used for valuing nature and nature's contributions to people are based on rules like who can participate (connecting with procedural, epistemic and recognition justice) (see Chapters 1, 4 and 5) and in what capacity, what are considered valid value expressions and how value expressions can be aggregated as social values or deliberated as shared values (see 2.4.2.1, 2.4.2.2). Institutions, moreover, play a role in forming individuals and collective actors. Decisions made by political, economic and civil society actors are based on different institutionalized logics (e.g., human and environmental rights and regulations, democratic rule / voting, cost-benefit analysis, bottom line considerations, deliberation) (see 2.4.2.3).

5. Specific values are diverse and mediate between nature, nature's contributions to people and good quality of life. Despite their distinct definitions, specific values are not mutually exclusive and can overlap (see

2.2.3.3). For example, food may simultaneously have instrumental and relational values, depending on the measure. Broad values inform people's understanding of what a good (quality of) life consists of. Under the umbrella of this general understanding, specific values express the particular ways in which nature's contributions to people can contribute to a good life. Some of the relationships between broad values and good quality of life can be considered objectively (e.g., disease incidence and life expectancy), while others depend on what life frames matter most or are prioritized in a given context, and the broad values associated with these framings.

6. **The life frames link different subsets of broad and specific values, including with regard to nature's contributions to people and good quality of life, but also in terms of how nature is framed as important more broadly.** Life frames can be used as a tool to mediate between ways that people relate to nature, or to why nature is important (see 2.3.2). Life frames are not mutually exclusive overarching framings of human-nature relationships. Rather, they can be seen as different sources of concern for the natural world. Both individuals and collectives can harbour multiple frames, though one or more may be emphasized in particular situations.

7. **Specific values can be assessed using biophysical, economic and socio-cultural indicators.** Indicators can be qualitative or quantitative. Some indicators are more suitable to identify diverse values, while others elicit a single set of value types. Value indicators can be comparable or compatible, but direct comparison is often not possible due to their different conceptual or ethical underpinnings or technical characteristics (see 2.2.3.3). Recognising and operationalising value plurality through multiple indicators is particularly important for complex and contested policy questions (see 2.2.3.3); in these cases, it is also key to bridge diverse values and indicators through deliberative shared values approaches, rather than aggregation into single measures of social value (see 2.4.2.1). This assessment recognizes that certain groups, under specific contexts, wish for their values not to be compared, or indeed the underlying assumptions associated with certain values are so different that they need to be used in parallel.

8. **Cultures, languages and geographies affect all aspects of human-nature relationships**, including the way that nature and its contributions to good quality of life are conceived of (see 2.2.2), the degree to which different life frames are emphasized (see 2.3.2), and the way that broad and specific values are conceptualised, expressed and operationalized through behaviours and decisions (see 2.4.1, 2.4.2).

2.6.2 Relevance for supporting value-plural policies

Many international environmental and development policies recognize nature's diverse values, enunciating a range of broad values (e.g., sustainability, justice, equity) and specific values (e.g., intrinsic, instrumental, relational). However, a review of national biodiversity strategies and action plans found a predominance of instrumental values. None of those reviewed explicitly detailed how to treat diverse values in policy tools. Incorporating a dynamic and relational understanding of values would help move these policies beyond the extant dichotomy between people and nature (or people versus nature) that is part of the predominant anthropocentric worldview behind a central prioritization of economic growth and instrumental values, often to the detriment of other values. This chapter demonstrates that people recognise not only material, non-material and regulating nature´s contributions to people, but also values that express meaningful and often reciprocal relationships with nature, and values for nature beyond its importance to people (see 2.2.3.2, **Box 2.4**). Drawing on nature's diverse values can make otherwise neglected, intangible costs and benefits visible in environmental policy, and at the same time, enable representation of diverse voices in decision-making, thus supporting a more inclusive and legitimate process, as well as a better understanding of the sources of environmental conflicts. For example, drawing upon relational values can facilitate justice, social equity and sustainability outcomes (see 2.2.3.2, 2.2.3.3), including the attainment of international policies and agreements, such as the SDGs. The chapter also recognises alternative and / or incompatible understandings of values across cultures and contexts. Yet objects or subjects of value can be important across more than one value type (and life frame). This potential convergence can be used to build common understanding across stakeholders in support of conservation, justice and/or sustainability (see 2.2.3.3).

Value-related outcomes can be achieved by forming and/or changing values through individual and social processes (see 2.5.1), but also by giving attention to institutional structures and decision-making contexts that can activate or hinder certain values (see 2.4.2). Many environmental and development policies are oriented towards changing values within the individual to support sustainability (see 2.4.1, 2.5.1). Social dynamics (e.g., gender roles, intergenerational equity) and social context (e.g., institutions structuring decisions) also influence how values are constructed over time. The same regards socio-ecological processes **(Table 2.6)**. Furthermore, value articulating institutions have a powerful role in shaping value expression. Institutions rely on different forms of power (e.g., framing power, structural power, rule-making power) and define which values of nature can be integrated into environmental policy and decision-making (see 2.4.1.4; 2.4.2). For example, the UK

fisheries and Niyamgiri case studies reveal that the policy focus and valuation design will influence which life frames and associated values are emphasized (see **Boxes 2.8** and **2.12**, Annexes 2.5 and 2.6).

Policy settings can support justice and sustainability by drawing on this more inclusive understanding of the diverse values of nature. Practices that can encompass this more inclusive understanding include: (a) engaging diverse values and knowledge systems (see 2.2); (b) seeking to activate values, attitudes, beliefs and norms that are likely to support pro-environmental behaviour (to the extent that values influence behaviour; see 2.4.2, 2.5.2); (c) encouraging collective reflection and allowing for expression of multiple value structures through institutions (see 2.4.2); and (d) changing the institutions that manage and impact specific economic, political decision-making and socio-cultural processes (see 2.4.2.3.1).

However, sustainability is not a single homogenous value, but relates to diverse broad values that are different depending on what life frames are emphasized. Examples include fair distribution of resources within and between generations (living from nature) and achieving sustainable relations of harmony and connectedness (living as nature). Decision-making contexts can activate sustainability-aligned values (see 2.4.2, Chapter 5). By choosing which life frames to emphasize in specific contexts, multiple sets of sustainability-aligned values can be balanced, embedded in institutions, and harnessed for sustainability transformation, while negative values arising from overemphasis of any single frame can be avoided or minimized (see 2.3.2).

2.6.3 Relevance for the values assessment

This chapter provides the conceptual basis for the assessment's subsequent chapters. Chapter 3 expands on the findings from section 2.2 regarding indicators and preferences, distinguishing methods families based on nature-based, statement-based, behaviour-based and integrated valuation approaches for assessing broad and specific values in plural decision-making contexts, including valuation as practiced by indigenous peoples and local communities. Chapter 4 expands on the different forms of values expression and institutions developed in section 2.4 to examine valuation uptake for public information, decisive project appraisal, policy instrument design and legal dispute resolution purposes. Chapter 5 explores how sustainability-aligned values (see 2.2.3) can be encouraged by different policy interventions or planning processes that can shift values (or their expression or prioritization) by removing barriers to or creating favourable context (see 2.5). To support Chapter 6's mission of developing capacity for assessing and integrating the nature's diverse values into decision-making, Chapter 2 offers a set of knowledge and capacity gaps to be addressed in future research and practice (see **Box 2.15**).

Box 2 15 Chapter 2's knowledge and capacity gaps.

This chapter identified knowledge and capacity gaps in the understanding and operationalization of diverse values between different cultural groups, academic disciplines, social roles and policy domains. ILK and western philosophies of good living (see 2.2.1) are often presented in a polarised way in the literature. Future research would benefit from presenting how diverse local communities in the global north and global south draw upon or are guided by different philosophies. The value types have been considered primarily from an ethical and social science perspective, but less so from a biogeographical perspective. For example, what kinds of biophysical features lead to particular human-nature relationships that in-turn support particular kinds of values expressions? There is an important need to further study life support values, including the way people express the value of life-supporting processes, functions, and systems, which cut across instrumental, relational and intrinsic values (see **Box 2.5**). Future research would also benefit by comparing and contrasting diverse understandings of human-nature relationships and life frames across disciplines and knowledge systems, and explicitly relate them to different broad and specific values or use them to bridge instrumental, relational values, and intrinsic values (see 2.3.1). Also, how values are represented at the societal scale requires further investigation, including more systematic comparison between social values from individual aggregation and shared social values in different contexts.

While there is ample study of negative drivers on biodiversity and ecosystems (e.g., research on environmental degradation or conservation conflicts), there could be a more explicit treatment of the role of negative values (e.g., living against nature, living disconnected from nature) compared with the positive orientation and / or on trade-offs between different frames, often connoted with general values theory and policy frameworks.

There is a need to continue creating new information regarding the relationship between social roles and power structures (e.g., gender, ethnicity, race, colonial legacies) and how values are expressed in decision-making. One way to address such dynamics would be via systematic comparison of different institutionalized logics (e.g., economic incentives and governance structures that emphasize instrumental values) and how they operate given different contexts (e.g., community, markets)

Box 2 15

and affect different stakeholders (e.g., business, consumers, citizens) (see 2.4.2). Finally, while it is common for environmental policies to seek to modify values (e.g., education, awareness campaigns), more study is needed on how values are affected by conservation interventions (e.g., community engagement, deliberation, environmental education, ecological restoration) and shifting linked socio-ecological baselines (e.g., languages and ecoliteracy loss and species extinction, pandemics, natural disasters, climate change; see 2.2.2, 2.5.1, 2.5.2). It is also clear that relationships between values and behaviour and human action are extremely complex (see 2.4.1). More research that focuses specifically on these complex relationships would help better understand the multi-faceted implications of values.

These diverse conceptualizations of nature and its values also require enhancing certain capacities. Many conceptual issues have direct implications for the practical management of decision-making processes drawing on the diverse values of nature. Such decision-making implies the ability to recognize and validate knowledge developed by indigenous peoples and local communities (i.e., legitimacy, procedural and recognition justice), thereby connecting worldviews, values and policymaking in IPLC contexts and applying them to environmental management not only of local areas and indigenous territories, but also more broadly (see 2.2.1, 2.2.2). This need includes specialized training for decision-makers on IPLCs worldviews and governance structures to properly engage with and articulate ILK-based values in policymaking (see 2.2.1, 2.2.2). Furthermore, the capacity to integrate strategies for cultural and biological diversity implies such abilities as the creation of *in situ* language revitalization programs that could produce fluent speakers connected to their environment or participatory environmental education that is inclusive of diverse social groups (see 2.2.2). Conversely, historically disadvantaged groups need greater abilities to have agency and overcome power dynamics to articulate their own values in their own terms (see 2.4.1).

The concept of relational values seems to be mostly used by academics, but there is also a need to operationalize this concept in environmental policy (e.g., environmental impact assessments) and corporate governance (e.g., accounting; environmental, social and governance criteria). As such, mainstreaming diverse values into new forms of corporate and civil governance (e.g., legal instruments, technical training) means developing the capacity, time and resources to shift the focus from solely material well-being to wider goals of reciprocity, care and justice that are grounded in different socio-cultural groups and languages (see 2.2.1; 2.2.2; 2.2.3). It also requires building capacity to consider decisions from the perspective of multiple life frames (see 2.3). Enhancing the conceptual proficiency of decision-makers is inextricable from the practical applications they carry out, such as conducting risk assessments that consider the risks of under- or over-emphasis of specific values (e.g., instrumental, relational, intrinsic) or ways of organizing values (e.g., specific life frames). Finally, training is necessary to also make practitioners aware of how different value articulating institutions may allow or resist value and behaviour change and affect outcomes of sustainability policies (see 2.4.2). Building these capacities would allow participatory valuation processes that ensure diverse values are supported.

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Chapter 3

THE POTENTIAL OF VALUATION[1,2]

COORDINATING LEAD AUTHORS:
Mette Termansen (Denmark), Sander Jacobs (Belgium), Tuyeni H. Mwampamba (United Republic of Tanzania/ Mexico).

LEAD AUTHORS:
SoEun Ahn (Republic of Korea), Antonio J. Castro Martinez (Spain), Nicolas Dendoncker (Belgium), Houda Ghazi (Morocco), Haripriya Gundimeda (India), Mariaelena Huambachano (Peru, New Zealand/ United States of America), Heera Lee (Republic of Korea/Germany), Nibedita Mukherjee (India/United Kingdom of Great Britain and Northern Ireland), Gabriel Ricardo Nemogá (Colombia/ Canada), Jonas Ngouhouo Poufoun (Cameroon/France), Ignacio Palomo (Spain), Ram Pandit (Nepal/Australia), Marije Schaafsma (Netherlands/United Kingdom of Great Britain and Northern Ireland), Andy Choi (Republic of Korea).

FELLOWS:
Anna Filyushkina (Russian Federation), Marcello Hernández-Blanco (Costa Rica).

CONTRIBUTING AUTHORS:
Fisola Emmanuel Adesuyi (Nigeria), Glarinda Andre (Vanuatu), Mulubrhan Balehegn (Ethiopia), David N. Barton (Norway, United Kingdom of Great Britain and Northern Ireland /Norway), Clinton Beckford (Canada), Jacqueline Beggs (New Zealand), Hanne Carla Bisjak (Germany), Raïsa Carmen (Belgium), Michael Cepek (United States of America), Michelle Cocks (South Africa), Lauren Cooper (United States of America), Juan Cusanero Elias (Guatemala), Florence Daguitan (Philippines), Florence De Longueville (Belgium), Bathsheba Demuth (United States of America), Evangelia Drakou (Greece), Alvaro Fernandez-Llamazares (Spain), Raphael Filippelli (Brazil), Jeanne Freitag (Germany), Miguel Gonzalez (Nicaragua), Ben Groom (United Kingdom of Great Britain and Northern Ireland), Dolf de Groot (Netherlands), Ellen Guimaraes (Brazil), Terry Hartig (United States of America), Till Jacob Heydenreich (Germany), Robert K. Hitchcock (United States of America), Ida Marie Højgaard Jørgensen (Denmark), Andra-Ioana Horcea-Milcu (Romania), Robert Johnston (United States of America), Amalie Kafling Nørrelund (Denmark), Pratikshya Kandel (Nepal), Edna Kaptoyo (Kenya), Merata Kawharu (New Zealand), Mira Kracke (Germany), Johan Lammerant (Belgium), Freja Larsen (Denmark), John Lengoisa Samorai (Kenya), Jerome Lewis (United Kingdom of Great Britain and Northern Ireland), Berta Martin-Lopez (Spain), Luiza Martins Karpavicius (Brazil), Errachid Montassir (Morocco), Roldan Muradian (Netherlands), John-Baptist Naah (Ghana), Aidin Niamir (Islamic Republic of Iran), Carl Obst (Australia), Søren Bøye Olsen (Denmark), Begüm Özkaynak (Türkiye), Elvia Rufo Jimenez (Spain), Juan Francisco Salazar (Chile), Fernando Santos Martin (Spain), Rieke Schneider (Germany), Alyssa Solvie (Germany), Tammy Stenner (Canada), Andrew Stratton (United States of America), Natalia Stryamets (Ukraine), Krystyna Swiderska (United Kingdom of Great Britain and Northern Ireland), Anna Joy Thompson (United States of America), Paula Ungar (Colombia), Susanne Vetter (South Africa), Pekka Virtanen (Finland), Priscilla Wehi (New Zealand), Patricio Zanabria Vizcarra (Peru), Eduard Zdor (Russian Federation), Eglee Zent (Bolivarian Republic of Venezuela), Rasmus Zitthen (Denmark).

REVIEW EDITORS:
Joshua Farley (United States of America), Ernesto Raez (Peru).

TECHNICAL SUPPORT UNIT:
David González-Jiménez, Victoria Contreras.

1. This is the final text version of Chapter 3.
2. Authors are listed with, in parentheses, their country or countries of citizenship, separated by a comma when they have more than one; and, following a slash, their country of affiliation, if different from that or those of their citizenship, or their organization if they belong to an international organization. The countries and organizations having nominated the experts are listed on the IPBES website (except for contributing authors who were not nominated).

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The designations employed and the presentation of material on the maps used in the assessment do not imply the expression of any opinion whatsoever on the part of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. These maps have been prepared or used for the sole purpose of facilitating the assessment of the broad biogeographical areas represented therein.

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THE POTENTIAL OF VALUATION

EXECUTIVE SUMMARY

Valuation of nature is a process that is intentionally undertaken to generate information about values of nature and of human-nature relations. While all individuals knowingly and unknowingly undertake some form of valuing to inform their everyday decisions, this chapter only addresses valuation that is conducted for purposes beyond those of the individual, usually for collective or societal benefits. In the context of decision-making about nature, valuation makes visible the range of values surrounding a given issue and can facilitate and recognise them and enable their inclusion in decisions. In such contexts, valuation is conducted by knowledgeable individuals (valuators or valuation experts) entrusted to apply established valuation procedures for eliciting and synthesising values.

The goal of valuations is to achieve improvements in human well-being, ecological sustainability and justice of decision-making processes and outcomes. More specifically, valuations can: support decisions about alternative projects or policies; inform the course of (collective) action; aid in the design of policy tools and instruments; assess and even strengthen human-human and human-nature relations.

This chapter assesses the merits of a wide range of discipline-focused and traditional valuation methods and approaches. We explore valuation methods from the fields of economics and ecology, as well as other procedures and practices that are used to assess the value of nature and human-nature relations, including those undertaken by Indigenous Peoples and Local Communities (IPLC). In doing so, we have adopted a broad definition of 'valuation methods', that recognises a wide range of procedures that are currently accepted (by their communities of practice) as valid ways to undertake valuation. By following established procedures, valuation methods can be taught, learned, and applied by valuation practitioners (valuators) acquainted with them. Since valuation methods have originated from different cultures, disciplinary traditions and schools of thought, different methods embody different ways of thinking about how to identify values, measure them or compare them against one another.

Questions emerge whenever people give a mandate to a (group of) valuator(s) to conduct a valuation process to inform a decision. Who is providing this mandate? what is its scope? who is conducting the valuation? how will the valuation results be used? which values are considered? whose values are (not) taken into account? Intertwined with these questions is the choice of appropriate methods. This choice requires assessing what valuation methods are capable of, what their drawbacks are, and which contextual considerations are key to make better valuation choices.

Assessing valuation (methods and approaches) requires consideration of the suitability of methods and approaches within a context and political process. Valuation goes beyond technical procedures of method application. The valuation methods assessed in this chapter focus on 'valuation of nature' in the broadest sense, including for instance: a ritual to confirm community relations to nature described in traditional knowledge or anthropological research; biophysical models to evaluate ecosystem services; deliberative social appraisal of the impact of nature on wellbeing; or expression of the values of nature in monetary terms through revealed preference methods. Our evidence covers the entire field of valuation of nature, which has substantially grown and diversified over the past 40 years.

The primary objective of this chapter is to identify key considerations for making valuation choices and developing guidance for improving valuation practice. To this end, the chapter synthesises existing knowledge on valuation methods in order to identify the range of valuations that exist, how they have been applied and what their limitations are. The chapter assesses the potential of valuation methods to elicit and make sense of diverse values. It does not cover the effectiveness and actual uptake of valuation outputs into decision-making processes (which is the subject of Chapter 4).

The evidence base of *this chapter* consists of systematic in-depth reviews, topical meta-reviews, and methods reviews of the existing literature from all involved disciplines, content analysis of expert contributions, dialogues with and contributions from Indigenous and local knowledge holders, and thematic expert contributions. The chapter first describes the richness of valuation methods, then derives key considerations for valuation and ends with a stepwise guidance framework to support better valuation choices.

In the following text, 15 key findings summarise main considerations, principles and recommendations to make methodological choices regarding valuation of nature.

Key findings

1 Valuation of nature is conducted with the aim of achieving improvements in human well-being and ecological sustainability, and just decision-making processes and outcomes *(well established)*. Valuation assesses nature's importance for human well-being using a wide range of indicators from livelihood dependence, use of natural resources, peoples' preferences or spending on safeguarding biodiversity and ecosystem services {3.2.3}. Valuation for ecological sustainability has been achieved through assessment of the importance of ecosystem capacity, condition and sustainable use {3.2.3}. In addition to intertwined goals of improving human well-being (31% of valuations) and ecological sustainability (65%), justice was considered in 4% of valuations in the systematic review {3.3.1}. Valuation is intended to inform decision-making in different ways, from purely providing information (61% of cases in the systematic review), to assisting in selecting between alternative actions (32%) and providing insights for design, management or policy interventions (7% of cases) {3.2.1.1}.

2 A rich pool of methods and approaches exist to value nature and its contributions to good quality of life. Methods from a wide range of disciplines and traditions offer a multitude of ways to elicit and interpret the diverse values of nature for decision-making *(well established)*. More than 50 clearly distinct valuation methods are identifiable from the last four decades of valuation research and practice; many more exist depending on how one defines methods considered to be 'nature valuation' {3.2.1}. Having been developed from disciplines as diverse as – for example – anthropology, biology, economics, geography, psychology, and sociology, they form a rich resource of valuation procedures that are currently being applied to elicit many value types and to inform on how values vary and change across time, space and social contexts {3.2.1}. In the last two decades, valuation applications have extended across the globe **(Figure 3.1)** and in a broad range of ecosystems. Most valuations took place at below-national scales (72%), while national (11%) or above-national scales (6%) are less abundant {3.2.1}.

3 Existing classifications of valuation methods are based on disciplinary perspectives (e.g., economics, ecology, political science, etc.), making it a challenge to foster interdisciplinary exchange to advance valuation practice *(established but incomplete)*. Ultimately, all valuation methods gather their information from three main sources (components of nature, people's statements and people's behaviours), while others integrate and synthesise values to improve understanding and decision-making. Numerous classification systems exist to group valuation methods. While each existing classification system has its merits within the disciplinary context in which it has been developed, their application across disciplines is limited {3.1.1}. Regardless of their disciplinary origins, methods can be organised into four method families that are

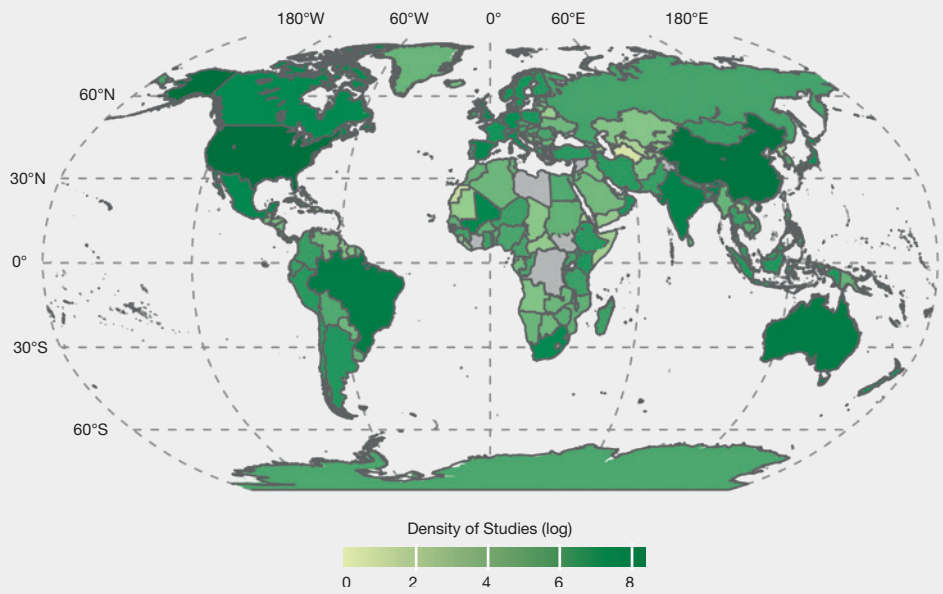


Figure 3 1 **Global distribution of valuation studies in the period 2010-2020 as reported in academic literature based on key words searches in Web of Science [3].**

3. Valuation Atlas (https://doi.org/10.5281/zenodo.6468906).

not based on discipline-informed assumptions about human-nature relationships. Nature-based valuation methods assess the biophysical world in order to measure and characterise nature and components of nature to make nature's contribution to people and the importance of nature-in-itself visible to decision-making {3.1.1, 3.2.2.1}. Statement-based methods infer values based on what people express when asked about what they value and why; their responses can be verbal, written or expressed as songs, stories or art {3.1.1, 3.2.2.2}. Behaviour-based methods assess the importance of nature to people based on what people do with and in nature, including their purchasing behaviour, use of natural resources and time spent in nature {3.1.1, 3.2.2.3}. Methods that combine and synthesise several sources of information (whether from the same methods' family or across families) can be categorised as integration methods {3.1.1, 3.2.2.4}. Within method families, when selecting specific methods, practitioners can apply a range of approaches to suit different valuation objectives **(Figure 3.2, Table 3.1)**. For example, methods can use quantitative or qualitative approaches, they can be participatory or non-participatory. The four methods families were largely developed based on a review of the academic literature; however, we also recognize that IPLCs have developed their own set of valuation approaches. Applying the methods family framework to understand valuation procedures that are undertaken by IPLC can help to highlight commonalities across valuation traditions and IPLC practices and procedures that resemble non-IPLC methods. However, the method family typology risks presenting IPLC valuation practice out of context and omitting core cultural and spiritual beliefs that underpin IPLC ways of valuation.

Valuator familiarity with the underlying assumptions of methods and their potential and limitations is critical in valuation practice to ensure that methods are correctly applied, yet, it is rarely assessed.

4 Nature-based valuation methods gather and analyse information on the biophysical properties of nature making them an essential family of methods for assessing ecological sustainability and quantifying and qualifying nature's contributions to people. When complemented with behaviour and statement-based valuations, they can provide critical information for informing policies and decisions about nature *(well established)*. Human societies have a long and established history of assessing nature and natural resources to make decisions for the collective, hence the strength of nature-based methods lies in their long history of trial and error and on their tendency to focus primarily on perceivable dimensions of nature. Nature-based valuation methods comprise the largest group of method families and reports of their application are the most frequently encountered in academic literature {3.2.2.1}. The methods employ direct and indirect approaches for measuring components of nature ranging from actual observations in the field (e.g., camera trapping, vegetation surveys, water sampling) to remotely sensed observations (e.g., based on satellite imagery) and expert consultations (e.g., Delphi methods, participatory resource mapping, and interviews). Most methods formulate their estimates based on proxies rather than direct measurements of nature. Direct and indirect assessment of nature is also undertaken in IPLC through their own methods, such as by conducting targeted territory

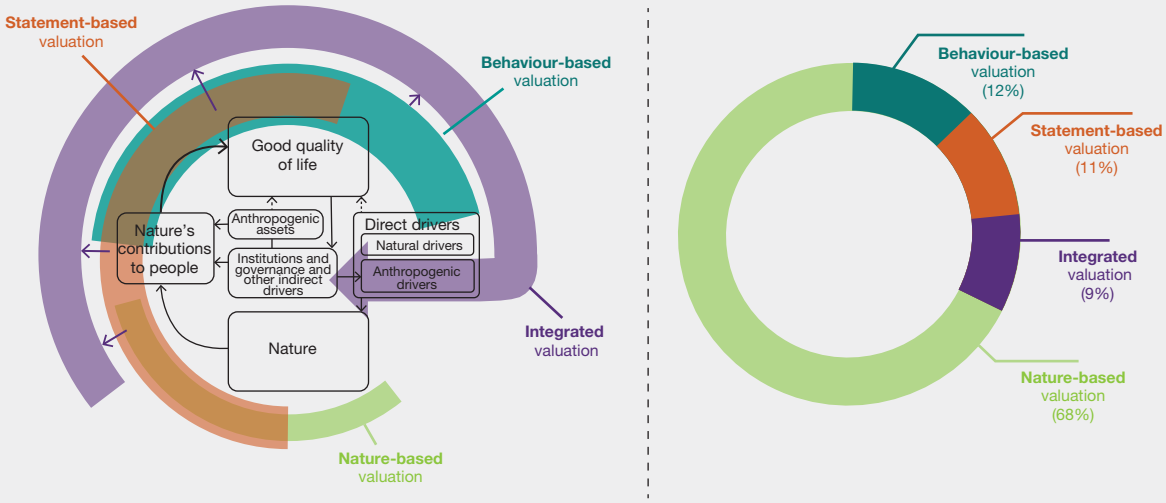


Figure 3 2 **Discipline-neutral valuation method families and their coverage of the IPBES conceptual framework (Díaz *et al.*, 2015b) and abundance of the method families in the valuation literature[4].**

4. Systematic PCIV (Principles, Criteria, Indicators, Verifiers) review on valuation methods (https://doi.org/10.5281/zenodo.4404678).

Table 3 1 **Valuation methods can be classified into four method families with distinct characteristics.**

	Valuation method families			
	Nature-based methods	Statement-based methods	Behaviour-based methods	Integration methods
				
What is assessed?	Nature, physical or ecological components of nature	What people express when asked about the importance of nature	What people do in nature, for nature, with nature, to, as nature	Different outputs from one or more methods, to support decision-making
How is information about values generated?	Measuring nature and its functions through several methods such as remote sensing, field observations, consulting experts, etc.	Asking people (interviews, questionnaires), analysing other expressions (e.g., narratives, discussions, art, etc.)	Observing people, assessing records of people's behaviour (e.g., park visits, policy choices, (non-)market exchanges, etc.)	Synthesising, comparing, contrasting, deliberating, consolidating or aggregating diverse values for decision-making or decision support
Which values are elicited	Mainly intrinsic and instrumental values	Instrumental, intrinsic and relational values	Mostly instrumental values	Instrumental, intrinsic and relational values
Examples of value indicators	Species richness, CO_2 stored, ecological indicators	Preferences for nature's contributions to people, subjective well-being indicators, narratives of human-nature relationships, required compensations	Time spent, share of household income, prevalence of disease, price of land, use of plants	Strength of support or objections to policy options, welfare gains or losses from projects
Examples of methods and approaches	Biodiversity assessment, ecosystem services mapping, Delphi method	Group discussion, Q-methodology, choice experiments, valuation interviews	Participant observation, travel cost method, cost-based method, livelihood dependence, photo-series analysis	Natural capital accounting cost-benefit analysis multi-criteria decision aid, integrated modelling, deliberative decision methods
Type of stakeholder inclusion	Most methods do not include stakeholders, though some inclusive approaches exist (e.g., based on local ecological knowledge)	Most methods include stakeholders to some extent (e.g., surveys) and inclusion is often integral to the method (e.g., participative approaches)	Most methods have limited stakeholder inclusion (e.g., analysis of market accounts) but some include diverse stakeholders	Some methods can be non-inclusive (e.g., desktop multicriteria decision analysis MCDA) but often, inclusion is key to the decision support aspect (e.g., participatory scenario building)
Examples of typical valuation "products"	Biodiversity indices, maps of priority areas for policy/management action, improved understanding of the importance of components of nature	Ranked importance of components of nature or nature's contributions to people, (monetary) value of protection of biodiversity-rich areas, explanations for why people value nature	Ranked importance of components of nature or nature's contributions to people, quantified changes in values nature or nature's contributions to people, explanations for why people value nature	Ranked policy options, evaluation of socio-economic and environmental impacts of policy options, improved understanding of conflicts/ shared values of nature
Limitations/ concerns	Impact on people assumed but not assessed, dependence of nature is not assessed by the people dependent on the resources	Concern about reliability of statements, power disparity can reduce the validity of group-based methods, representativeness in selection of respondents	Requires conceptual and empirical understanding of the relationships between behaviour, nature and its contribution to well-being, challenging to reveal in-depth understanding of motivations behind behaviour	Aggregation of values across groups of people can reduce representation of values, combining multiple value types creates incommensurability concerns

patrols or *ad-hoc* reporting by individuals of observed biophysical indicators (e.g., the recent appearance of new grass in grazing areas) {3.2.4}. Nature-based methods share some key constraints and limitations. For instance, biodiversity and ecosystems models are heavily reliant on assumptions about key processes and input data. Also, global imbalances in the availability of high-quality biophysical information have repeatedly been identified as a key constraint for its widespread incorporation into decision-making, particularly in less wealthy nations. This is partially due to their relatively high cost and skills requirements needed to transform data into useful information for

decision-making through data processing, analyses and modelling {3.2.2.1}. Choosing a method is a value-laden process that has implications for which ecosystem services or species are prioritised. Yet this process is rarely reported, and the issue is rarely discussed for nature-based methods {3.2.2.1}.

5 Behaviour-based valuation applies a range of direct and indirect methods to assess values of nature based on observations of what people do. Values based on observed behaviour are regarded as less influenced by participant and interpreter bias and bring robust information for decision support *(well established).* Behaviour-based valuation can be traced back to the 1940s and includes diverse valuation methodologies varying from expressing how nature underpins productive activities to valuation of non-material psychological experiences from recreational activities {3.2.2.3}. The main strengths of most of the methods are that they reveal values from observed behaviour and are therefore less sensitive to participant or interpreter biases than statement-based methods {3.2.2.3}. The main limitations for wider application of the behaviour-based methods are their methodological inflexibility and generally high requirements for data availability {3.2.2.3}. Furthermore, the methodologies tend to be specialised to a limited range of value targets {3.2.2.3}. A key limitation of cost-based methods is that they can be a poor reflection of the benefits that people obtain from nature; however, they are often used because they have low resource requirements {3.2.2.3}. IPLC valuation practices that assess values based on what people do in the landscape, what they consume, how community members trade goods and services between each other, or which rules are broken or adhered to by community members shares components of behaviour-based valuation {3.2.4}. Behaviour-based valuation has the potential to contribute to Natural Capital Accounting {3.2.2.3} **(Box 3.7)** as they capture observed interactions between ecosystems and economic activities which are amenable to accounting principles. Improved access to environmental, social and economic databases across global regions could reduce the barriers for the application of these methods.

6 Statement-based valuation methods generate information, based on individual or group expressions, about people's relation to and perceptions about nature and quality of life, and their preferences for material, non-material and regulating contributions of nature. Methods in this family can provide deeper understanding of worldviews and motivations underlying peoples' values of nature *(well established)*. A wide range of methods have been developed to understand the values of people and communities by engaging them in activities that encourage value expression through verbal, written or other forms. These methods permit capturing how humans value nature in ways that cannot be deduced from market-based approaches or direct observations of people's behaviour or their practices. Consequently, statement-based methods can complement nature-based and behaviour-based valuation. Methods in this family include interviews and group discussions, contingent valuations, choice experiments, and mental mapping. Some IPLC valuation practices that draw heavily on people's expressions, can be described as containing components of statement-based {3.2.4}. By identifying, characterising and assessing values that are directly expressed by people these methods have contributed to theoretical understanding of what is valued (i.e., specific values) and why (i.e., broad values) {3.2.2.2}. Because they mostly rely on what people say, statement-based methods can facilitate direct interaction and inclusion of stakeholders in the valuation process {3.2.2.2} however, they have been criticised for being over-reliant on what people say and being subject to the valuators' own interpretations of what is said (i.e., they are sensitive to participant or interpreter biases). Solutions to some of the challenges of statement-based valuation have been developed, although they have not completely resolved the fundamental concern regarding reliability of statement-based valuation {3.2.2.2}. Mainstreaming this family of methods into policy and other decision-making domains could diversify the range of actors and values that are brought into decision-making processes {3.2.2.2}.

7 Obtaining information about values alone is insufficient for guiding inclusion of values in decision-making. Integration methods attempt to serve this objective by synthesising values towards decision-making. However, depending on the method and how it is applied, value integration can inadvertently conceal social complexities and promote/discriminate values *(well established)*. Integrated valuation methods bring together different values of nature and human-nature interrelations {3.2.2.4}. The approaches are diverse and include decision support tools for project and policy evaluation; but also modelling and scenario building methods to consolidate information for decision-making through the exploration of the interactions between ecosystem processes and human and environmental drivers. Cost-benefit and multi-criteria decision analyses are common integrated valuation approaches. Another example is participatory mapping of nature's contributions to people, which can integrate information from nature-based and statement-based methods to spatially define and quantify the importance of different facets of nature. Production function approaches can help bring together information on nature's biophysical values (from nature-based valuations) and economic values (from behaviour-based and statement-based methods) to estimate the costs and benefits of projects or policies {3.2.2.4}. The United Nations System for Environmental Ecosystem Accounting synthesises physical

information on ecosystem extent, condition and services with monetary valuation of ecosystem services and asset/natural capital value {3.2.2}.

8 IPLC undertake valuation in their territories using diverse approaches, procedures, and practices aimed at fulfilling multiple goals *(established but incomplete)*, but there is incomplete understanding about valuation within IPLC settings *(well established)*. As with other societies, IPLC uphold valuation traditions within their own communities and territories to generate pertinent information about their inter-relations with nature for fulfilling specific purposes, such as maintaining reciprocal relations with nature and contributing to ecological sustainability. Through diverse approaches and practices, IPLCs use valuation processes to enhance well-being, transmit and generate ecological and cultural knowledge, and reinforce their cultural identity with land and waters. A more complete description and characterization of IPLC valuation is hindered, however, by a scarcity of studies and limited regional representation of existing works. Available works suggest that valuation by IPLC shares many of the attributes of non-IPLC valuation. For example, IPLC valuation practices that assess values based on what people do in the landscape, what they consume, how community members trade goods and services between each other, or which rules are broken or adhered to by community members shares components of behaviour-based valuation {3.2.4}. Although IPLC valuation is sometimes led by a few community experts, it is often a collective process whereby most – if not all – community members participate as experts to gather information on values and to collectively assess its meaning. Understanding the wealth and depth of IPLC valuation will require expanding stringent disciplinary definitions of "methods" and concepts such as "evidence" {3.2.4} **(Figure 3.3)**. The field of indigenous methodologies and methodologies from other knowledge systems is growing and offering opportunities to recognize and include IPLC and other knowledge systems to describe and develop valuation methods that adequately elicit and articulate their values. Ethical standards and guidelines for engaging with IPLCs to undertake valuation exist and should be widely applied {3.3.1}.

9 Valuation studies are capable of representing diverse value dimensions. In practice, most studies assess instrumental values although studies assessing intrinsic and relational values are also abundant *(well established)*. The instrumental values of nature for human well-being are the most common focus for valuation (74% of valuations in literature), but the valuation of the intrinsic worth of nature (20%) and relational values (6%) are also established in the literature (well established). 'Living from' is the most common perspective for valuation (41% of valuations in a systematic review), followed by the 'living with' and 'living in' perspectives (34% and 20% respectively). The 'living as' perspective is rare (5% of valuations in a systematic review) {3.2.3}.

10 Valuation needs to be robust if it is to provide valuable information for decision-making. However, best practices to achieve robustness are not universally accepted, and vary substantially across disciplines and knowledge systems *(well established)*.

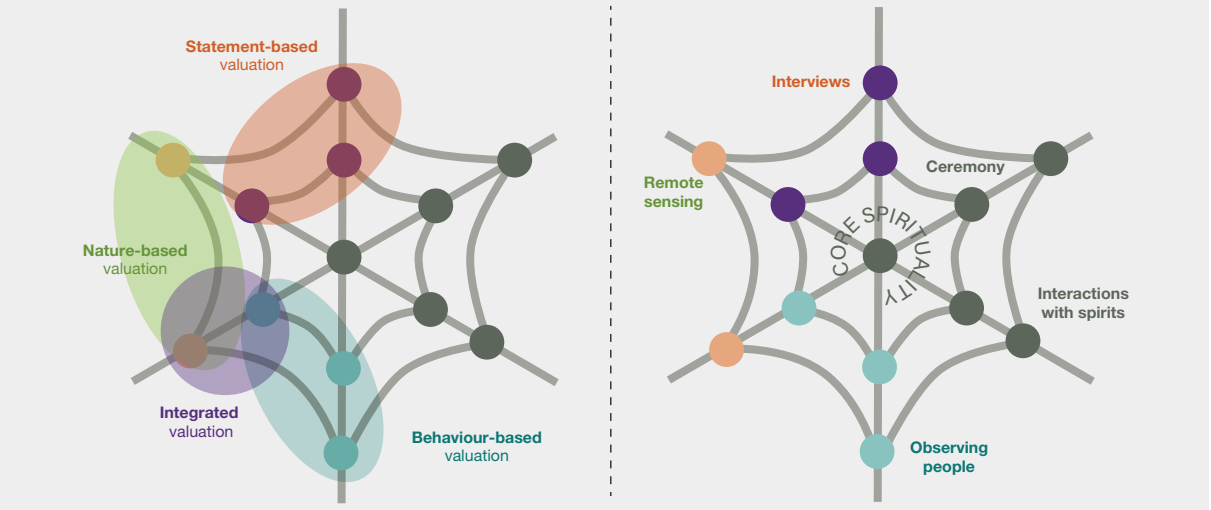


Figure 3 3 **Visual representation of how the methods families (left) act as selective filters that make only isolated elements of IPLC valuation visible.**

To the right: Three examples (interviews, remote sensing, and observing people) of how the method families framework accesses elements of IPLC valuation. Two examples of integral elements of IPLC valuation not accessed or represented by methods families (e.g., valuation as ceremony and interactions with spirits).

In reference to methods, robustness refers to the ability of a method to provide reliable and consistent representation of values. Research on robustness of valuation processes has focused on different aspects of robustness, reflecting the different intended use of the valuation outputs. The economic valuation literature has emphasised theoretical consistency and accuracy to enable a broader range of values of nature to be included in economic policy and project appraisals {3.3.2.2}. Valuation in the social sciences has focused on robustness in terms of the legitimacy of the process to recognize diverse value systems and enable dialog {3.3.2.2}. Robustness testing of methods allows methods to be continuously improved making them more reliable. For example, continuous testing of stated preference valuation results has resulted in more robust methods to ascribe peoples' values of nature using statement-based valuation {3.3.2.2}. Adhering to best practice across diverse valuation approaches can greatly improve the robustness of valuation {3.3.2}. In practice, while two thirds of valuations consider at least one aspect of reliability, these aspects as well as the way they are addressed vary widely between methods {3.3.2}. Given the diverse purposes and contexts within which valuation is conducted, valuation studies need to report more regularly on how they addressed robustness and what uncertainty remains in the results.

11 Procedural justice has become a key consideration in valuation to ensure that all stakeholders are heard, and that the valuation process is accessible. Consensus on how to achieve procedural justice in valuation and how to evaluate good practice is largely lacking *(well established).* Procedural justice in valuation refers to the fairness in the valuation process. Fairness in valuation processes relates to how representation of different stakeholder groups is ensured, the extent to which participants can get involved in the process and how power disparities between participants can be addressed in the valuation process. A considerable number of valuations represent diverse stakeholders (48%) and have distinguished different social groups based on gender, income, age, education level, indigenous rights, power, type of knowledge held, different stakes and different political roles {3.3.2.3}. Most often (30%), two or more of these variables are considered. However, even though it is recognised that power asymmetry can undermine the inclusion of participants {3.2.2.4}, few valuation studies document how power asymmetry is accounted for in the valuation process (1% of studies in a systematic review). The contribution of valuation to achieve fairer decision processes relies on transparent and tested methodologies. Validation of procedures to take procedural justice into account is lacking and best practice guidance is needed.

12 Aggregation of values held by individuals to inform collective decisions is central to valuations *(well established)*. Yet, aggregation has important implications for fairness and robustness of valuation. No consensus exists on the best practice for aggregation procedures *(well established).* Decisions on nature most often have impacts on multiple stakeholders. Therefore, decision-making involves weighing up the impacts to arrive at an overall evaluation i.e., a societal value. Weightings to account for intergenerational distribution of outcomes of projects or policies through application of discounting procedures is established and contested {3.3.2}. Intragenerational weighting procedures to consider distributional justice for practical use in project and policy evaluation are developed but not widely used {3.3.2}. Most valuation studies focus on the values of a specific group of people from the current generation. A range of aggregation approaches are used, with the sum of individual's values being most widely adopted. Deliberative approaches can be suitable in some valuation contexts but do not provide a general solution to the aggregation challenge. Therefore, practical options to consider intragenerational distributions are needed for more robust aggregation of valuation results.

13 Plural valuation is a strategy to include more diverse values, with the aim of increasing legitimacy, justice and robustness of valuations *(established but incomplete)*. It is achieved by combining complementary methods that elicit multiple value types *(unresolved).* Valuation methods have varying capacity to identify diverse values {3.3.1.3}. Valuation methods exist to elicit different components of value, including: use, non-use and option values, various contributions of nature, aspects of biodiversity and quality of life, broad values related to different life frames of nature's values, different specific values (instrumental, intrinsic and relational), and IPLC principles. Plural valuation allows multiple types of specific values to be captured (e.g., different NCP) and different broad value frames (e.g., life value frames) to be considered.

Most valuations do account for some degree of such specific and broad plurality {3.3.1.3}. However, only few valuations have a high specific (1.3%) or broad (0.6%) plurality. Capturing a richer diversity of values can be achieved by combining several complementary methods, but the use of multiple methods requires careful consideration, since their underlying assumption and disciplinary origin can make some methods incompatible with one another. Despite the wide range of methods available, most valuations (77%) only apply one main method. Where combinations of methods have been employed, the methods used have come from the same discipline {3.3.1.3}. In cases where diverse values need to be captured, complementary methods from different disciplines are required. In practice, consulting valuators from different disciplinary backgrounds can help select the appropriate method(s) to produce scope-relevant results.

Combining methods however is more demanding regarding skills, resources and time. The level of investment in the valuation process depends on the complexity and stakes of the valuation context: high stakes and high complexity justify investing in a more complex and demanding valuation (see Chapter 1). The operating space for valuation is determined by risk and resources **(Figure 3.4)**. Underinvestment in valuation risks to misinform decisions and produce adverse effects. Parsimony on the other hand advises against using more resources and time than justified by the benefits or losses at stake {3.4} **(Figure 3.4)**. Note that for decisions of low complexity and stakes, no valuation might be needed at all. Similarly, for medium complexity and stake, often a simple valuation might suffice **(Figure 3.4)**.

When multiple methods are applied, often incommensurable results are obtained, adding complexity to the decision-making process. For instance, a decision might need to be based on information on diverse types of values such as economic costs and benefits, socio-cultural importance, ecological value and principles held by the population regarding human-nature relations. These values are not fully separable or fully comparable: any value indicator will reflect partial aspects of different values. This is inevitable in plural valuation and implies that transferability of value estimates across valuation context poses risk in decision-making. In practice, the majority (56%) of valuations do not attempt to bring different values together, but instead use distinct biophysical, monetary and socio-cultural indicators. A primary objective of valuation is to allow different but compatible values to be comparable e.g., to enable prioritizations in decision-making. About half of the valuation studies that do bring different values together apply methods allowing values to be directly compared {3.3.1}; the other half compares bundles of values, or uses relative weights based on participants' or valuation experts' rankings or deliberation {3.3.1}. Less than 1% of valuation studies keep values separate (i.e., treat them in parallel in a deliberative process) {3.3.1}.

14 Trade-offs between the relevance, robustness and resources define the operating space for valuation within each decision-making context *(established but incomplete)*. Clarifying the purpose and subsequent scoping of a valuation process can help identify the values at stake and ensure the *relevance* of the valuation for decision-making. As the choice of valuation process influences the outcome, relevance entails ensuring that all the values at stake are accounted for; rather than only eliciting those values that can easily be made visible with the readily available tools and skills {3.3.4, 3.4.1.3}. *Robust* use of methods refers to the ability to provide reliable and consistent evidence following transparent and legitimate value elicitation processes. Robust valuation methods

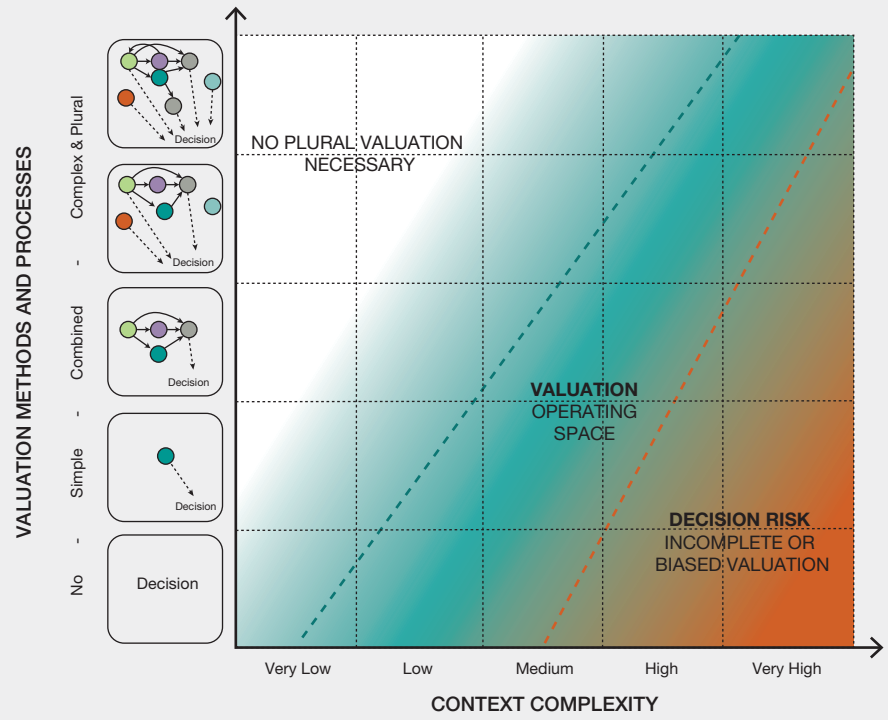


Figure 3 4 **The valuation operating space: valuation methods and processes from 'none' to 'plural' as a trade-off between decision risk and resources spent on unnecessary valuation.**

therefore require both that values elicited are reliable and that they fairly represent the values at stake. Robustness therefore entails adhering to theoretical consistency and accuracy to allow reliable impact evaluation. It also requires a socially legitimate process to recognize and include diverse values and enable dialogue {3.3.4, 3.4.1.5}. Testing the robustness of methods is key to making valuation gradually more reliable for decision-making {3.3.2, 3.3.2.1}. Standardisation and adhering to best-practices can greatly improve valuation robustness {3.3.2, 3.3.4, 3.4.1.5}. Valuation requires employing *resources*, including time, financial, technical, human and political resources. Comprehensive information on resource needs for valuation methods is lacking {3.3.3}.

15 The valuation process can be summarised in five steps. Valuation choices made in each single step define options in the next steps, and finally determine the quality of the valuation. The steps are (1) constructing a legitimate process; (2) defining the objectives of the valuation; (3) scoping the valuation; (4) selecting and applying methods, and (5) facilitating the uptake in decision-making. Following these steps and reporting on the decisions made improves transparency of valuations *(well established)*. A five-step approach includes the steps needed to cover key considerations of the valuation process {3.4.1}. The five-step model illustrates that the application of valuation methods and approaches is part of a larger process, and it is largely this process which can ensure that valuation methods provide quality input to decision-making. The valuation process includes the following steps **(Figure 3.5)**. Step 1 – construction of a legitimate process – requires that the providers of valuation information are explicitly defined, and transparency about how a robust valuation is ensured regarding representativeness or participation {3.4.1.1}. Step 2 – defining the purpose of the valuation and the intended use of the outputs {3.4.1.2}. This purpose is often clear from the decision context or the given problem, but the valuation process can benefit from fine tuning and (re)defining this purpose with the stakeholders engaged in the first step. Step 3 – scope of the valuation defines what is being valued, whose values are being represented and whose are not. Also, feasibility constraints in terms of financial, human and technical resources need to be evaluated {3.4.1.3}. Step 4 – choice and application of valuation methods, combining an appropriate set of nature-based, statement-based, behaviour-based or integration methods {3.3.4, 3.4.1.4}. Step 5 – articulation towards decision-making requires transparent communication of the outputs, as well as limitations and omissions in the valuation which might affect (risks in) their application {3.4.1.5}.

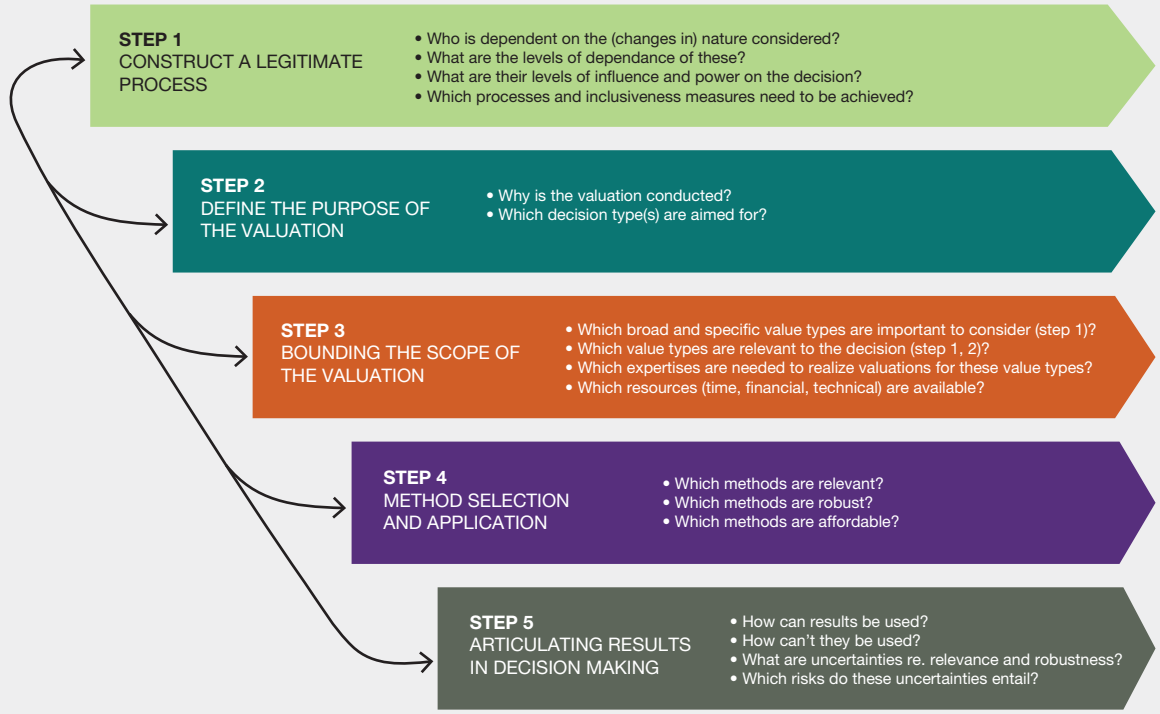


Figure 3 5 **Valuation process depicted in 5 steps.**
The choice and application of an appropriate (set of) valuation methods is embedded within this larger process.

3.1 AN INTRODUCTION TO VALUATION OF NATURE

3.1.1 What is valuation of nature and human-nature relations?

Chapter 2 provided a comprehensive introduction and assessment of how people and societies value nature in terms of how they relate to nature, the importance that they assign to all or parts of nature, and the different ways that they manifest their relations with and preferences for nature. The act and process of valu*ing* nature is expressed by individuals, groups, and societies in either explicit perceivable forms or implicit and allusive ways. As Chapter 2 has outlined, some of the ways in which valuing of nature manifests in societies is through:

- How people talk about nature or their relations with nature
- How people spend valued resources such as time and money on nature-related experiences, goods and services
- How people depict nature in art, literature, song and other forms of artistic expression
- How nature is embedded in personal or societal aspirations such as life goals or constitutions
- How people choose between different options for actions related to nature
- How nature is incorporated into lifestyles, career choices, or
- How people regard and subsequently treat nature

Valuation of nature is the process of documenting the existence of values, identifying when and where and by whom they are expressed, that in turn allows characterising values. Recognizing which and whose values and their characterization in a given context allows making values visible and increase the probability for their inclusion in decision-making. In the context of nature-related decision-making and policy design, valuation is an important process for ensuring that decisions are informed by existing values and that they ultimately reflect the values of those affected by decisions **(Figure 3.6)**. In many cases, a multiplicity of actors (e.g., different stakeholder groups) and value types (i.e. broad and specific values) surround a decision-making context. Understanding which and whose values are at play requires valuation processes that capture value plurality and articulate it for better informed decisions.

While individuals consciously and unconsciously undertake some degree of valu*ing* to interpret and understand nature or to assess their own and others' relations with nature, in this chapter we only address *formal* valuation, conducted for purposes beyond those of the individual, usually for collective or societal benefits. To this end, we focus on valuation that generates information about nature's values that can ultimately be used to, for example:

- Design policy tools and instruments for conservation and sustainable management of nature and natural resources;
- Choose between alternative projects or policies;
- Understand, mitigate or transform socio-environmental conflicts;
- Assess the potential damage to nature of different [policy] decisions;
- Collectively celebrate, honour or acknowledge the importance of nature.

Valuation methods and approaches

Regardless of who undertakes valuation, valuation processes are guided by methods and approaches that enable recognition of values of nature and human-nature relationships. A *valuation method* is a procedure for *eliciting and articulating values of nature*. Elicitation methods include a wide range of data collection techniques that are used to gather information about values. Value articulation is the process of generating clarity and coherence of the values elicited. Firstly, it consists of analysing, interpreting and communicating values; and secondly of organising value expressions to support different decision-making purposes. Methods lay out which procedures and what techniques will be combined at different steps of the valuation process. Ideally, valuation methods are standard and accepted approaches to be applied within their decision-making context.

Valuation approaches are defined here as higher-level assumptions, ideas or beliefs that underpin methods. They translate key decisions on how a method is to be applied or how the information generated by methods is to be interpreted. For each approach there are often multiple accepted methods that adhere to the basic assumptions and ideas of the given approach. In the case of valuation, approaches determine whether valuation will be participatory or not, whether it is only academically and institutionally oriented or not, whether values will be expressed in monetary or non-monetary terms, spatially specific or not, place-based or not, whether values will be elicited using direct or indirect techniques, or whether

contested values will be deliberated or assessed by other means. Valuation approaches can also manifest as academic "traditions" or widely accepted and expected protocols for undertaking valuation. All valuation traditions are heavily informed and influenced by cultural context, epistemologies and worldviews.

Ideally, a valuation method is informed by an explicit theoretical framework that outlines key assumptions about how and why people value nature **(Figure 3.6)**. It informs procedures for data collection (value elicitation), data analysis, data interpretation (values articulation). In some cases, validation procedures might also be spelt out and certain ways of communicating and presenting the results might be encouraged (e.g., as maps or narratives or graphical representations). In real world applications of valuation methods, however, various theories inform a valuation study or mixed procedures are undertaken to elicit and articulate values. Moreover, valuation methods might provide specific guidelines for some aspect of valuation – such as how values are to be elicited – while providing little to no instructions on which data analysis techniques to apply, while other methods/approaches provide the full suite of epistemological backing and procedures from eliciting till communication. The result is that a broad range of existing methods and approaches from a wide array of disciplines are considered as "valuation processes": they outline how values of nature can be identified, interpreted, or assessed. This offers valuators a range of methods to choose from and combine, to fit to the purpose of the valuation for the specific decision-making context. While this is an opportunity to improve the practice of valuation, it represents a challenge for the assessment of methods. Applications of methods to real world decisions are to a large extent unique to a specific event in space and time. Thus, evaluation criteria for valuation quality vary between disciplines and approaches and comparing a sufficient number of studies with the same configuration of methods or in similar contexts is rarely possible.

Valuation *sensu* IPBES includes diverse epistemologies, different views on nature-human relations, and recognizes academic traditions in social and environmental sciences that address and study values in seemingly contrasting ways, albeit for similar or complementary goals. This assessment aims to bridge academic and societal boundaries and

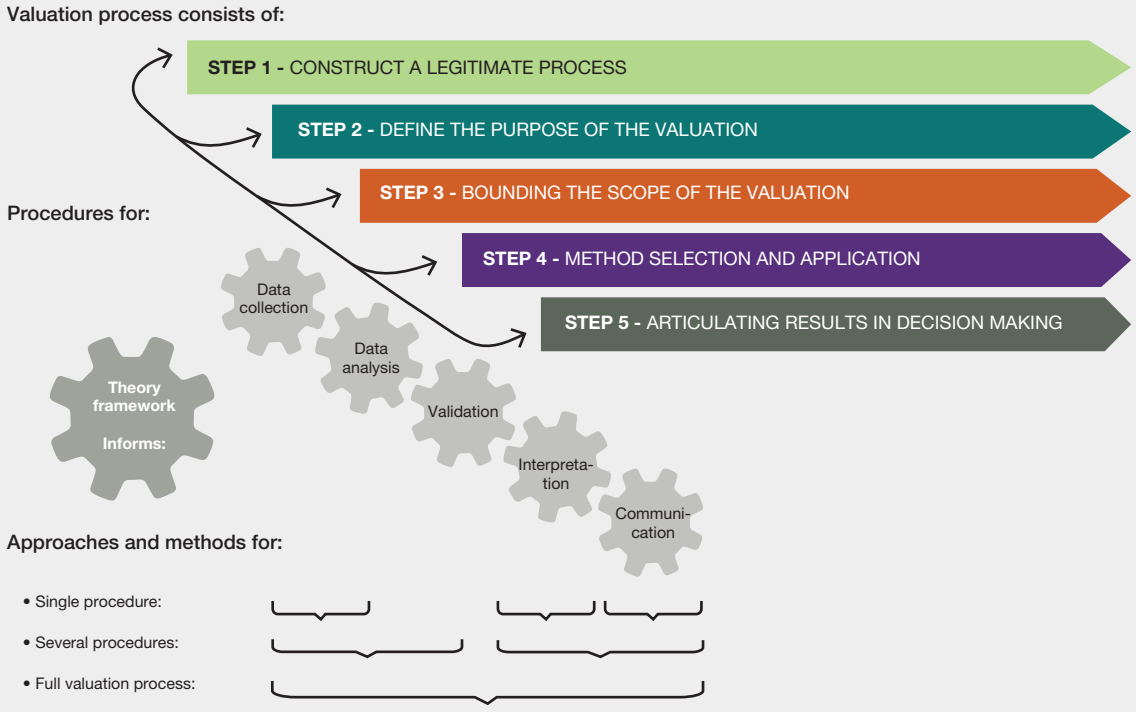


Figure 3 6 **The five steps in the valuation process (see 3.4) are realised through interacting procedures, underpinned by theory.**

Valuation methods can offer a full set of procedures for undertaking all steps of the valuation process or only some procedures. Valuators often must combine complementary methods to ensure that all relevant steps are addressed. Valuators are not always explicit about the theories underpinning their methodological approach. They may also report specific techniques that they used without describing the precise procedures or methods informing their study.

broaden the set of methods and approaches available to reliably and legitimately generate information on values of nature in order to improve nature-related decision-making. In this vein, Chapter 3 uses the term "valuation methods" as a shorthand for a *broad and inclusive collection* of "valuation methods and approaches", recognizing a wide range of valuation traditions and practices that are currently accepted as valid ways to undertake valuation. By adhering to established procedures, the key features defining valuation methods is that they are approved by a community of practice, and that they can be taught, learned, and repeatedly applied by valuation practitioners who are acquainted with them. Having originated from different cultures, disciplinary traditions and schools of thought, methods embody different ways of thinking about how to identify values, measure them or compare them to each other. IPLC valuation methods and practices are still in the process of being systematised and this chapter acknowledges its importance for inclusive valuation of nature.

The origin of valuation (elicitation and articulation of values) is ancient; valuation has informed and guided societies in decision-making about nature since early human history. Ancient valuation practices and their modern iterations continue to generate information about values today; they represent a body of valuation tradition that is the core source of information about values for individuals, communities and indigenous people worldwide. In the context of human history, the valuation methods and approaches that have been developed in academia are fairly recent; while they may have once drawn from ancient practices, they have subsequently diverged and evolved over time, usually along disciplinary lines. The methods and approaches taught today in academia are mostly informed by western worldviews and ways of generating knowledge, however. Understanding the practice of valuation solely from the dominant worldview of western science can obscure and undermine other values and knowledge systems. This chapter acknowledges and recognizes diverse worldviews such as perspectives and knowledge held by indigenous peoples and local communities about valuation of nature. Some indigenous worldviews elicit a holistic view of nature in which humans are part of and not detached from nature; this is a vital starting point for understanding how evidence is conceptualised, acquired and shared within IPLC contexts (LaDuke, 1999; McGregor, 2004). Assessing IPLC valuation practices and procedures solely through the lenses of western science approaches risks devaluing the interest of IPLC as "right holders" in valuation of nature exercises. Comprehension of Indigenous and local worldviews and knowledge systems allows demonstrating the diversity of valuation. This highlights the need to capture the full breadth of IPLC multidimensional interconnections of values or principles which inform valuation practices. This also requires an understanding of evidence within an IPLC context **(Box 3.5)**.

3.1.2 Why assess valuation methods and approaches?

The choice of valuation methods has a strong bearing on which values and whose values are elicited and how they are articulated. This, in turn, can affect decisions informed by valuations.

The urgency of the global environmental crises and the challenges in making progress towards agreed sustainability goals provide increasing opportunities to apply valuation as part of the governance of nature and human-nature relations. However, the capacity of valuation methods to fulfil their intended goals and to inform decision-making is highly variable and depends on how valuations are conducted. Knowledge on the capacity of methods needs to be advanced, and decision-makers and practitioners need guidance on which methods to apply, the conditions under which they can be applied, their underlying assumptions, what type of information they can generate and their limitations and resource needs.

The chapter provides an overview of available methods, characterises methods based on their shared attributes and assesses their applicability for different purposes and points to key sources for guidance on their application to support decision-making. The chapter evaluates for what purpose methods have been applied. This includes the types of values that have been assessed, the context in which valuation methods have been applied and whose values have been involved in the valuation processes. Building on earlier assessments, we consider valuation methods from a broader suite of scientific disciplines (natural, social and humanities) which are described in scholarly literature, grey literature, as well as indigenous and local knowledge (ILK) sources. The potential and limitations of the wide range of valuation methods are assessed to provide policy relevant guidance on how valuation can be improved to better support decision-making.

3.1.2.1 Classifying methods to facilitate their assessment

Existing typologies of valuation methods

Numerous classification systems exist to organise valuation methods and approaches into groups with shared characteristics or typologies that highlight key distinctions between them. Common classifications group methods based on the way methods articulate values (e.g., monetary/non-monetary), by disciplinary perspective (e.g., biophysical/economic/socio-cultural), based on how they elicit values (stated/revealed preference methods) or based on features of the elicitation process itself (participatory/non-participatory).

An early typology distinguishes direct and indirect methods as one dimension; and observed versus hypothetical behaviour as another key dimension of valuation methods (Freeman III *et al.*, 2014). This classification has influenced many subsequent refinements of economic valuation methods typologies. De Groot *et al.* (2002) includes group valuation as a distinct valuation method into economic valuation methods classifications.

The Economics of Ecosystem and Biodiversity (TEEB) initiative builds on earlier classifications but introduces biophysical valuation methods to assess value based on the intrinsic properties of ecosystems measured in biophysical units (e.g., in time, energy, materials, land surface, etc.) and are referred to as physical *costs* (TEEB, 2010). Deliberative methods are also included alongside stated and revealed preference methods in the TEEB typology.

IPBES typology of valuation approaches and perspectives: IPBES's Methodological guidance to values and valuation recognizes five perspectives (economic, biophysical, socio-cultural, ILK/Holistic and Health valuation) (IPBES, 2015). The five perspectives represent the different ways in which the term "value" is understood and subsequently analysed by different disciplines and knowledge systems:

- Economic valuation methods are founded in welfare economics. Economic values are based on individual preferences, reflecting individual needs, wants, perceptions and worldviews, as well as the scarcities imposed by nature and by the social and economic contexts within which people live.

- Cultural and social valuation methods aim to value nature and its contributions to people by discovering the psychological, historical, cultural, social, ecological and political contexts and conditions, as well as the worldviews and social perceptions that shape individually-held or commonly-shared values.

- Biophysical approaches assess value based on the intrinsic properties of objects by measuring underlying physical parameters. They generally aim to examine the ecological importance of attributes, qualities, and quantities characterising nature's condition and functioning.

- ILK/Holistic valuation systems aim to value the relationships and dynamics established among peoples and nature regarding the regeneration or reproduction of the systems of life of Mother Earth. They follow a rights-based approach; considering that living in balance and harmony with Mother Earth is based on the complementarity of the rights of Mother Earth and the rights of peoples to their holistic development and eradication of poverty.

- Health valuation methods aims to value effects on human health. They are used to assess how changes in nature affect the quality of life through health metrics describing physical and mental health at the core of human well-being.

According to IPBES integrative approaches offer opportunities to bridge the different valuation perspectives while also acknowledging *'the existence of different perceptions of what constitutes a "good life" across social groups and cultures* and acknowledging *the role of institutions, including social norms that underpin human-nature relations'* (Pascual *et al.*, 2017).

Further valuation typologies exist in literature, among others Raymond *et al.* (2014) suggest a typology of valuation approaches which categorises valuation into two main types: instrumental and deliberative approaches. They argue that each approach involves distinct perspectives on rationality, different processes of value elicitation, particular types of representativeness, and various degrees of decision-maker involvement (from Tadaki *et al.*, 2017). The typology proposed by Tadaki *et al.* (2017) operationalize valuation concepts along the degree of civic participation. The four notions of value they identify are: value as a magnitude of preference, value as contribution to a goal, values as individual priorities, and values as relations. The authors argue that when valuators conceptualise values as magnitudes of preference or as contributions to a goal, they tend to operationalize these in technical valuation tools, including monetary valuation, which allow experts to tightly structure (and potentially limit) citizen participation in decision-making. On the other hand, when values are conceptualised as priorities, valuation provides a way of describing individuals' priorities and considering how these priorities differ across a wider population usually through structured surveys. Finally, when values are conceptualised as relations, valuation is generally used to foster deliberative forms of civic participation.

While any classification has its potential merits, especially for their specific research or assessment purpose, they would severely limit the assessment of valuation in this chapter: Most typologies are restrictive to economic valuation methods, while Raymond *et al.* (2017) and Tadaki *et al.* (2017) distinguish valuation approaches only by the extent of involvement of stakeholders. Lastly, IPBES's typology is divided across disciplinary traditions, thematic focus and knowledge systems and ignores the fact that approaches (e.g., a deliberative approach) and even methods (e.g., participatory mapping) are often shared across these disciplines. Furthermore, pitching "economic" versus "sociocultural" or "IPLC related" versus "biophysical" risks to further polarise disciplinary or epistemic discussions rather than bridge them.

3.1.2.2 A discipline-neutral grouping of valuation methods: introduction to the method families

This chapters' broad and inclusive definition of valuation and explicit inclusion of methods and approaches from broad disciplines and academic traditions, that elicit and articulate values to enable decision-making in diverse contexts, are unamenable to existing typologies.

With a view to compare a wide array of valuation methods and approaches emerging from diverse disciplinary fields and traditions, we have grouped methods using a discipline-neutral lens. Here, methods have been classified into four "method families". The first three families are distinguishable from each other by a single criterion: their 'source' of information on values. Values can be derived from the environment or nature, from people's behaviours, and from people's statements. As such, methods can be grouped as nature-based valuation, behaviour-based valuation, or statement-based valuation. A fourth family – integrated valuation – captures methods aimed at characterising and articulating values by bringing together and synthesising different types of value information. We present a brief description of each method family here. A more thorough review of each family is presented in Section 3.2.

- *Nature-based valuation:* Quantifies or qualifies aspects of the physical world which are of importance to people. This can be based on -or derived from- physical measurements, but also on expert information and local or specialised knowledge.
- *Behaviour-based valuation:* Quantifies or qualifies the importance of nature for people based on what people do with/in nature. This can be based on observations of rituals and traditions, of time and efforts spent for nature or resources and money spent to experience nature. This information can be derived from direct observations of people or indirectly from databases or descriptions of behaviours.
- *Statement-based valuation:* Quantifies or qualifies the importance of nature for people based on what people state about the importance of nature and human-nature relationships. These statements can be narratives, importance scores or willingness to pay (or receive) money for changes in aspects in nature and human-nature relations. The statements can be obtained from direct interactions with individuals or groups of individuals. The valuation is mainly based on interviews, surveys or group discussions.
- *Integrated valuation:* Combines several sources of information on the importance of nature for people with the goal to integrate them towards a decision-making process. Integration can happen through integrated modelling, deliberative processes or aggregation procedures to bring together value estimates. While these methods draw on different other valuation methods from the former groups, they do not sit exclusively in either of these and have the specific goal of bringing values together from multiple sources. Several integration methods (e.g., participatory rural appraisal and multi-criteria decision analysis) can be considered decision support tools that explicitly aim

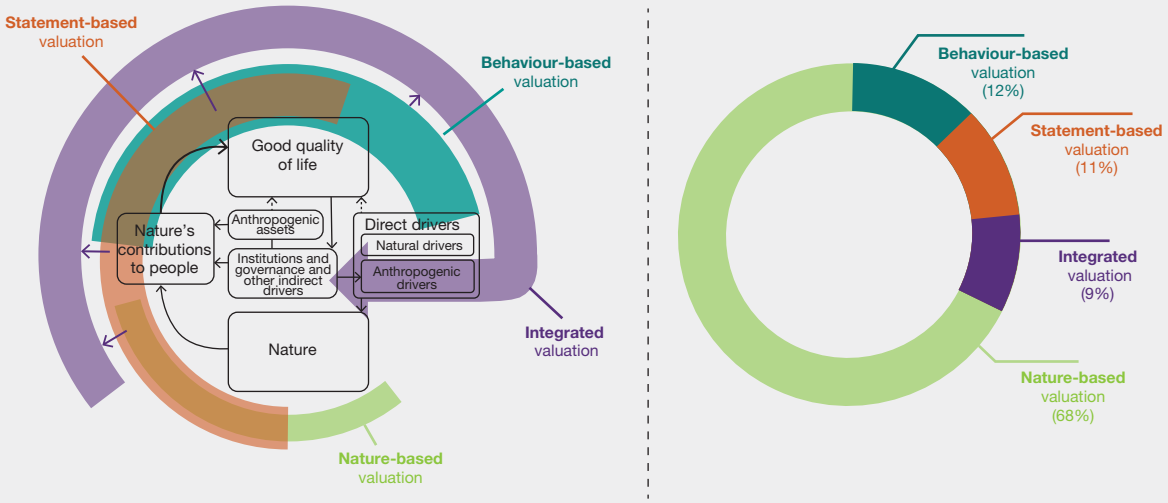


Figure 3 7 **Chapter 3 discipline-neutral valuation method families and their coverage of the IPBES conceptual framework (Díaz *et al.*, 2015) and abundance of the method families in the valuation literature[5].**

5. Systematic PCIV (Principles, Criteria, Indicators, Verifiers) review on valuation methods (https://doi.org/10.5281/zenodo.4404678).

to bring information on synthesising values to choose between alternative options.

Essentially, the families cut across existing classifications, and each method family consists of quantitative and qualitative valuation methods that are associated with biophysical, economic as well as socio-cultural approaches **(Figure 3.7)**. By sharing the same value sources, methods within families share similar ways of eliciting values and are confronted with many of the same limitations. Consequently, even though families contain methods that have been developed by different disciplines, the innate capacities and limitations imposed by the source of values become shared attributes of the family. This makes the methods families approach highly amenable to assessment of methods at a higher grouping level that is still relevant for understanding their potential and shortcomings for decision-making and – to some extent – independent of academic disciplines.

While the method families intuitively map onto the IPBES conceptual framework of human-nature relations **(Figure 3.7)**, it should be noted that the classification of methods families is not meant to be an intercultural nor a multi-worldview approach. It is a pragmatic approach that has been conceived for this specific assessment process. It is heavily informed by a western science worldview that is founded on the notion that values are sourced from a limited set of *places* (the environment and humans) and that methods can indeed be classified into distinct yet overlapping groups. The method family classification does not account for worldviews that consider additional value sources such as ancestors and other non-human entities, as is the case in many IPLC contexts. In this vein, the method families do not properly include IPLC practices and methods of valuation.

3.1.3 Previous assessments and significant reviews of valuation methods

Some notable assessments and major reviews on biodiversity and ecosystem services have been conducted in the past at different spatial scales – national, regional, and global. A brief description and the extent of valuation methods considered in these assessments and reviews are given in **Figure 3.8** and Annex 3.1. Among these, The Economics of Ecosystems and Biodiversity (TEEB, 2010), the United Kingdom National Ecosystem Assessments (UK NEA, 2011, 2014) and the United Nation's System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA EA) have assessed some valuation methods.

The methodological reviews in the scientific literature are dominated by an economic valuation perspective (e.g. Bartkowski *et al.*, 2015; de Groot *et al.*, 2020; Hanley & Czajkowski, 2019; Schild *et al.*, 2018; Turner *et al.*, 2015; Venkatachalam, 2004)[6]. Methodological reviews of nature valuation solely on non-economic valuation methods, such as socio-cultural valuation or indigenous and local knowledge-based valuation are rare. This may be because application of non-monetary valuation methods of nature are fewer, although this is changing (Chan & Satterfield, 2020). Very few studies exist that value (either in monetary or non-monetary terms) actual biophysical *changes* in ecosystems (Chan & Satterfield, 2020).

A systematic review of the peer-reviewed literature identified 41 review papers on methodological reviews mainly focused on economic valuation methods. Among these review papers, there are some thematic reviews that specifically focus on economic valuation of either biodiversity (Bartkowski *et al.*, 2015) or ecosystem services of a particular type – e.g., cultural (Cheng *et al.*, 2019), or regional (Wangai *et al.*, 2016), ecosystem-specific – e.g., mangroves (Barbier, 2016; Vo *et al.*, 2012), or their changes driven by a particular cause – land degradation and restoration (Turner *et al.*, 2015). In contrast, there are numerous reviews on specific economic valuation methods, e.g., 35 reviews on contingent valuation[7].

Numerous databases on valuation methods and approaches have been developed and serve as a useful resource for researchers, policy-makers, and valuation practitioners for selecting methods for valuation applications and decision-making. See Annexes 3.2 and 3.3 for a collection of databases on valuation studies and best practice resources, respectively.

Valuation assessments have tended to take a disciplinary approach, providing a partial picture of the types of methods available to consider. Assessing all available methods conjointly – irrespective of the disciplines and academic traditions that developed them – can help integration of diverse values by increasing availability of approaches tailored to the requirements of different contexts: a "more plural" valuation (see Chapter 1 and **Figure 3.7**) (Tress *et al.*, 2005). Moreover, valuation also occurs in non-policy contexts such as in indigenous and local communities, and in the private sector. Comparing methods across disciplines and practices requires an interdisciplinary and inclusive approach.

In light of this, the primary objective of this chapter is to provide an overview of existing academic methods and their application, and guidance to valuation specialists who work with practitioners and decision-makers looking to incorporate valuation into decision-making processes. To achieve this, the chapter analyses the goals, principles, capacities and applications of valuation methods; and

6. Previous comparative assessments of valuation methods (https://doi.org/10.5281/zenodo.4404320).
7. Previous comparative assessments of valuation methods (https://doi.org/10.5281/zenodo.4404320). (See document B).

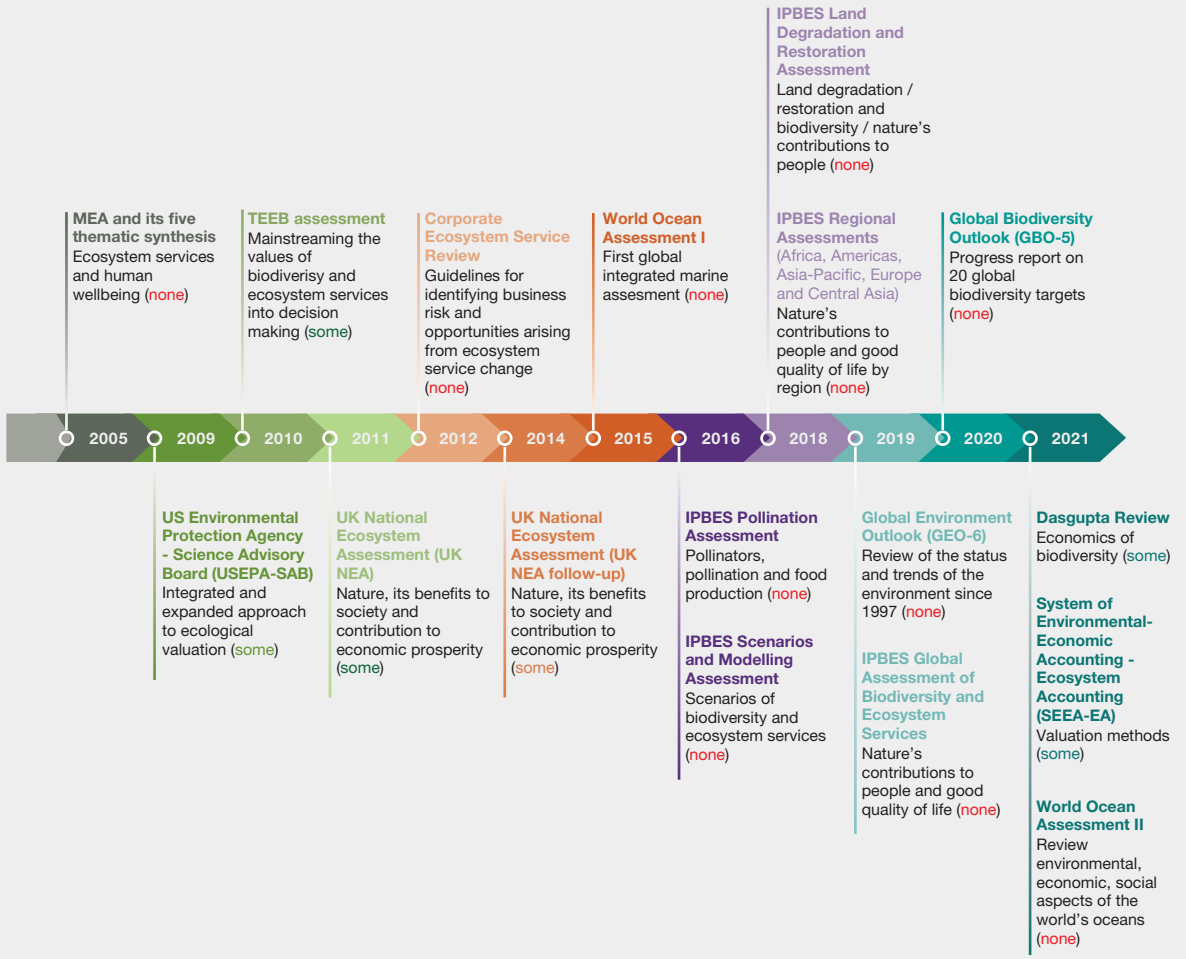


Figure 3 8 **Timeline of major biodiversity and ecosystem service assessments and major reviews, their main focus and the extent of the review of valuation methods (in parenthesis).**

provides an assessment of the potential and limitations of existing methods for informing decision-making processes.

3.1.4 The scope and evidence base for the chapter

The objective of the chapter is formally detailed in the scoping document for the values assessment. Several statements in the general part of the scoping document are relevant to Chapter 3, in addition to the specific scoping text. To achieve this mission and to shed more clarity on the specific objectives of the chapter the scoping statement was framed around six chapter-specific assessment questions. These questions inform the chapter's rationale and reporting structure. A brief description of each question is presented below, providing a short justification for each and pointing to the evidence that was assessed by Chapter 3 to generate responses for each question

3.1.4.1 The six assessment questions in Chapter 3

The six questions guiding valuation methods assessment in Chapter 3 are:

- **Assessment question 1:** *Why is valuation undertaken?* (Why are valuation methods applied? What purpose do they seek to address?)
- **Assessment question 2:** *Which methods are applied?* (Which methods and approaches have been applied to undertake valuation? To what extent are methods combined?)
- **Assessment question 3:** *Which values are elicited?* (Which types of values do valuations aim to elicit? How do valuations capture the diverse ways in which humans value nature? Which values are often or rarely elicited?)

- **Assessment question 4:** *When and where are valuations undertaken?* (When, where, and at which spatial and governance scales have valuation methods been applied? In which socio-ecological contexts have they been undertaken?)

- **Assessment question 5:** *Whose values are considered?* (Are valuation methods inclusive and do they allow for meaningful participation of stakeholders (including IPLC)? How do valuations deal with legitimacy, power and justice issues?)

- **Assessment question 6:** *How reliable and feasible is valuation?* (What are the limitations of valuations? How are validity, consistency and transparency considered in current applications? How feasible is it to include valuation methods and approaches in decision-making processes?)

3.1.4.2 The evidence generation process

Given the broad definition of nature valuation used in the values assessment and cognizant of the fact that – due to terminology and disciplinary differences – many valuation studies may not self-identify as such, this chapter therefore casts a broad net to capture literature and non-written material that represents the body of available knowledge on nature valuation. As such, the chapter bases its evidence on literature reviews (primarily from scholarly journals, but also from publicly available grey literature including previous IPBES assessments), reviews of methods guides and handbooks, and reviews of reports of IPBES ILK dialogues that were conducted as part of this and previous IPBES assessments. Where evidence was scarce, essays and other contributions were solicited directly from experts. This section describes how the evidence was sourced and the process that was used for consolidating, synthesising and, in some cases, analysing the information to generate the results and findings.

The six assessment questions described in Section 3.1.4.1 represent the line of questioning that Chapter 3 has taken in order to provide the most current understanding and critique of contemporary valuation. As depicted in Section 3.1.1, the chapter uses a broad working definition of valuation so that it can include the wide diversity of methods and approaches that are undertaken today by different disciplines, traditions, sectors and actors. In the interest of representing that diversity, multiple types and sources of evidence were consulted, aware that the assessment questions cannot be satisfactorily answered by a single approach **(Table 3.2)**. This section first describes the types of literature reviews that were conducted and the additional consultations that were undertaken to complement the literature reviews (see 3.2.2). followed by a detailed description of how the assessment questions were operationalised, specifically for the systematic literature review that was undertaken to assess application of valuation (see 3.2.3).

- In the case of *assessment question 1 (why is valuation undertaken?)*, information on purposes for valuation is derived from an overview and previous assessments review, thematic reviews of different types of methods, from a systematic review of scientific and grey literature on valuation applications, and from ILK.

- The assessment is tasked with providing an overview of existing types of valuation methods and approaches *(assessment question 2: which valuation methods?).* The main source of evidence for assessing this question are thematic reviews of methods. These are enriched with material from a systematic review of method applications in the context of nature, nature's contributions to people and human-nature relationships. Quantitative data from a literature search as well as information from an in-depth review were synthesised for individual types of methods.

- Evidence of how valuation methods address diverse values *(assessment question 3)* is an important aspect of the *values assessment*. This question helped identify whether different methods are able to capture a full range of diverse values or are limited to a smaller set of values (including broad and specific values, diverse value targets and life frames) (see Chapter 2). The main source of evidence to assess this question is a systematic in-depth review of valuation applications in scientific and grey literature. Especially for broad values, this is enriched with findings from ILK.

- A basic spatio-temporal inventory of applications of valuation *(assessment question 4)* – according to the main method types – is a requirement for understanding gaps in and ways forward for valuation. Also, the context in which a valuation method is applied is a main factor in understanding its applicability to different socio-ecological settings. The main source of evidence is a quantitative output of the literature search, which stretches across all global regions and a historical review of literature.

- The question of *whose values? (assessment question 5)* pertains to the perspectives of people holding different worldviews, potential to include diverse sources of knowledge, and consideration of power, gender, age, and distribution within and between generations. The two main sources of evidence are (1) a systematic review of valuation applications evidencing participation, representation and procedural justice aspects of the application of valuation methods, and (2) information obtained from ILK-assessment activities.

Table 3 2 **Summary of evidence sourcing methods applied in Chapter 3 (Source: adapted from table 1 of Grant & Booth (2009)[8, 9, 10, 11, 12, 13, 14].**

Type of approaches	Type of sourcing	Evidence selection	Analysis and output	Assessment question
Review of method families[8]	State-of-the-art review	Aims for comprehensive searching of current literature about valuation methods and approaches	Current state of knowledge, overview of challenges and debates	1, 2 and 3
Review of reviews[9]	Umbrella review	Qualitative assessment of existing reviews of valuation methods (based on both primary studies and grey literature)	Research gaps (what remains unknown), recommendations to improve the elicitation of values	2 and 6
Systematic review of methods applications[10, 11]	Systematic in-depth review	Aims for exhaustive, comprehensive searching of reported valuation experiences	What valuation experience can reveal about methods and how it can inform recommendations for practice	1 - 6
Thematic reviews[12]	State-of-the-art review	Aims for comprehensive searching of current literature on specific themes deemed relevant to valuation	Current state of knowledge of specific themes; trends, caveats and unresolved issues in valuation of nature	2, 3, 6
ILK dialogues[13]	Contributions by ILK-holders in dialogues organised with IPBES ILK liaison group; documented in reports	Aims for complementary evidence on valuation from IPLC perspectives	Findings on IPLC perspectives, adaptations in chapter conceptual and analytical framework, search terms and analysis criteria for other reviews	1, 2, 3
Consultations with ILK experts[14]	Written responses to questions, accompanied by other material, discussion via phone, email and in-person	Aims for complementary evidence on valuation by IPLCs for IPLC purposes	Content analysis and narratives to better describe IPLC valuation	1, 2, 3

Reliability and feasibility *(assessment question 6)* is an important aspect for the use of valuation methods to inform decision-making and policy processes. The evidence used for addressing this question includes an in-depth systematic review of valuation applications to document how validity and reliability are addressed in valuation applications. This is enriched with findings derived from thematic reviews on individual types of methods (grouped into method families) and other targeted reviews.

Together, these assessment questions provide evidence to the assessment using the "3R framework" to assess valuation methods. **Relevance** is assessed by combining the evidence from assessment questions 1-4. **Robustness** is evaluated based on assessment questions 5 and 6.

Resource needs are assessed using evidence from answering assessment questions 2 and 6. The multi-pronged approach that is applied in this chapter has provided a rich volume of valuation material to consult and assess, allowing – on the one hand – to confidently draw conclusions on multiple aspects of valuation, and on the other, to identify contested issues, inconclusive evidence, knowledge gaps and future directions in the field of valuation. Chapter authors are fully aware of the bias of the evidence base towards English-language literature and acknowledge that despite explicit targeting of IPLC approaches and principles, most of the sources used are still informed by western knowledge systems and epistemologies (Altbach, 2007; Ammon, 2012; Hakkarainen *et al.*, 2020; Rasmussen & Montgomery, 2018). This bias is a system-wide shortcoming of contemporary knowledge generation that reflects historical imbalances that persist to this date (Carter, 2004; Sutherland *et al.*, 2014; Tengö *et al.*, 2017).

In this regard, it is important to note that the assessment on IPLC aspects for the chapter served as an exploratory mechanism aimed at addressing existing knowledge gaps in the literature about IPLC valuation methods and approaches. It is by no means an exhaustive assessment of the range of IPLC valuation methods and approaches. The

8. Systematic review on Method Families (https://doi.org/10.5281/zenodo.4404436).
9. Previous comparative assessments of valuation methods (https://doi.org/10.5281/zenodo.4404320).
10. Systematic PCIV (Principles, Criteria, Indicators, Verifiers) review on valuation methods (https://doi.org/10.5281/zenodo.4404678).
11. Valuation Atlas (https://doi.org/10.5281/zenodo.6468906).
12. Systematic review on Method Families (https://doi.org/10.5281/zenodo.4404436).
13. Reviews on IPLC approaches to valuation (https://doi.org/10.5281/zenodo.4422079).
14. Analysis of Contributions on Values and Valuation Methods by ILK experts and holders (https://doi.org/10.5281/zenodo.4404612).

results presented in Section 3.2.4 should not be generalised beyond the IPLC contexts that they describe.

The five types of evidence sourcing applied in this chapter are complementary and include "review of reviews", "topical review of methods families", "systematic review of methods applications", "thematic reviews", "ILK dialogues" and "consultations with ILK experts" (see **Table 3.2**).

In summary, this chapter is based on multiple types of evidence sourcing to derive a comprehensive understanding of various aspects of valuation methods. In the review process, the authors considered qualitative descriptions of methods, derived quantitative data from applications to investigate how methods have been used in different valuation contexts, and engaged with indigenous knowledge holders to broaden the evidence base, the analytical approaches and the conceptual understanding.

3.2 THE RICHNESS OF VALUATION

The objective of this section is to give an account of the richness of nature valuation in terms of the abundance of methodologies that exist to undertake valuation, and the diversity of valuation disciplines and traditions. In addition to describing how valuation has evolved in academia, this section also provides an assessment of how the current practice of valuation of nature has developed to what it is today, including in IPLC contexts. The section demonstrates the characteristics of different valuation methodologies, structured using the methods families, highlighting some of the key developments in valuation methods. This also contextualises the trend of growing inclusiveness in the valuation process, the continued search for ways to integrate more types of values of multiple stakeholders, as well as the growing interest by indigenous scholars in developing valuation methods and metrics that better capture values as they are lived and transmitted in IPLC contexts.

3.2.1 Valuation Atlas: the diversity and global distribution of valuation practice

As an academic field, nature valuation is relatively young but involves a wide range of academic disciplines **(Figure 3.9)**. Although valuation literature is dominated by work from natural sciences disciplines, it extends across to social sciences and humanities to include disciplines such as economics and anthropology and inter-disciplinary work. For the purposes of this assessment, it should be noted that we only included biophysical and social assessments with a nature valuation purpose[15].

Although assessing nature, its importance and our interactions with nature have a long history, references to nature valuation as an explicit undertaking that applies

15. Valuation Atlas (https://doi.org/10.5281/zenodo.6468906).

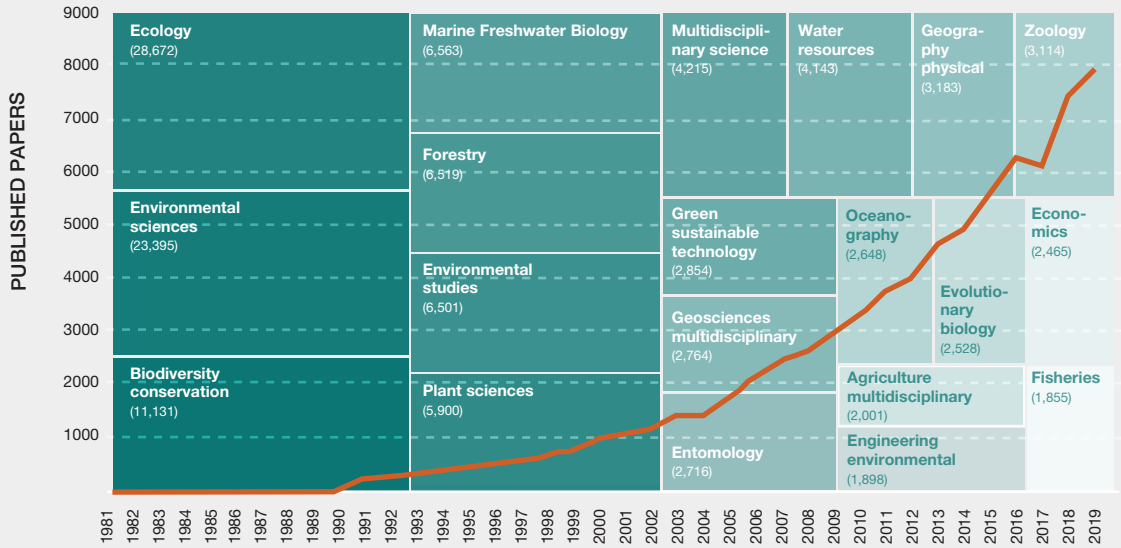


Figure 3 9 **Trend and disciplinary mix in nature valuation based on Web of Science.**

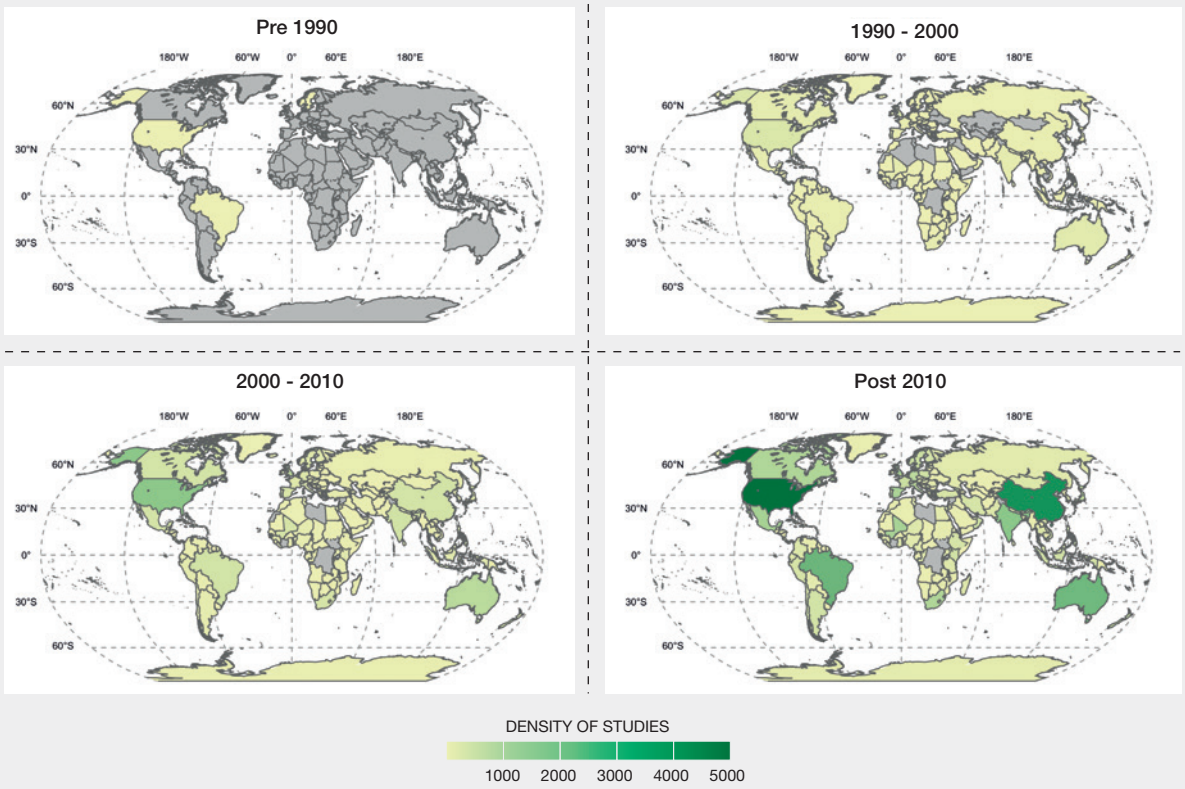


Figure 3 10 **Decadal country distribution of the corpus of nature valuation studies (n= 48,781)[17].**

specific methods and approaches are relatively recent. In academia, methods to assess the values of nature were mentioned in only a few publications in the 1980s, for example. Between 1990 and 2000, however, reported valuations in literature increased tenfold and increased by another fivefold between 2000 and 2020 **(Figure 3.10)**. Valuations are now conducted worldwide and since the 1990s all methods families have been applied across the global region. During the decade of the Millennium Ecosystem Assessment (2001-2005), valuation studies tended to be concentrated in a few countries (namely, United States, Brazil, India, United Kingdom). Between 2008–2018, the concentration of valuation studies in those countries increased with only some diversification to European Union countries, African countries, and China[16].

To understand the relationship between the frequency of valuation studies and the biological and socioeconomic context in which they are conducted, a Pearson correlation analysis was used, to compare the number of valuation studies, the IPBES Core Indicators, and a chosen set of other relevant indicators. The correlations are generally low and the indicators do not provide strong explanations for the global pattern. However, the analysis indicates that over the whole period: fewer studies have been carried out in countries with lower Gross Domestic Product (GDP) and more nature valuation studies where biodiversity and environmental degradation is higher (for example, places with low Biodiversity Intactness Index, or high rates of use of pesticides, or high wood removals). Valuation studies have also mostly been conducted where environmental protection is lower (for example, places with poor management effectiveness in National Protected Areas, or with high rates of corruption perception index)[18]. Given the scarcity of literature on IPLC valuation, it is not yet possible to identify a global pattern of how valuation methods and approaches vary across IPLCs (see 3.2.4).

Valuation has been conducted in all habitat types, but to varying degrees and with only small variations between method types **(Figure 3.11)**. Unlike the de Groot *et al.* (2020) study on ecosystem services specifically, which reported that valuation of water is the most frequently conducted, this review indicates that valuation of forests was the most abundant, followed by cultivated areas and freshwater habitats. Nature-based valuation methods, for

16. Valuation Atlas (https://doi.org/10.5281/zenodo.6468906).
17. (Idem).
18. Systematic review on valuation uptake (https://doi.org/10.5281/zenodo.4391335).

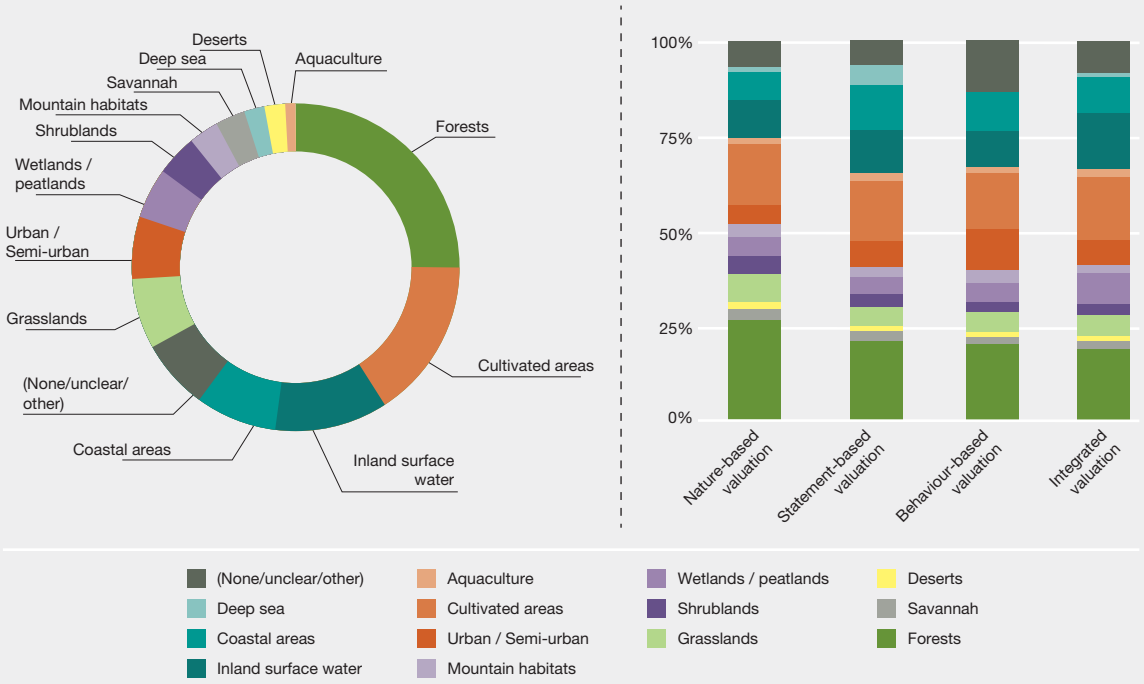


Figure 3 11 **Valuations per habitat type post 2010, using broad categories from the International Union for the Conservation of Nature Red List of Threatened Species Habitat Classification Scheme (IUCN, 2012).**

On the left, percentage abundance of valuations, on the right, distribution per method family (systematic in-depth review n=1163).

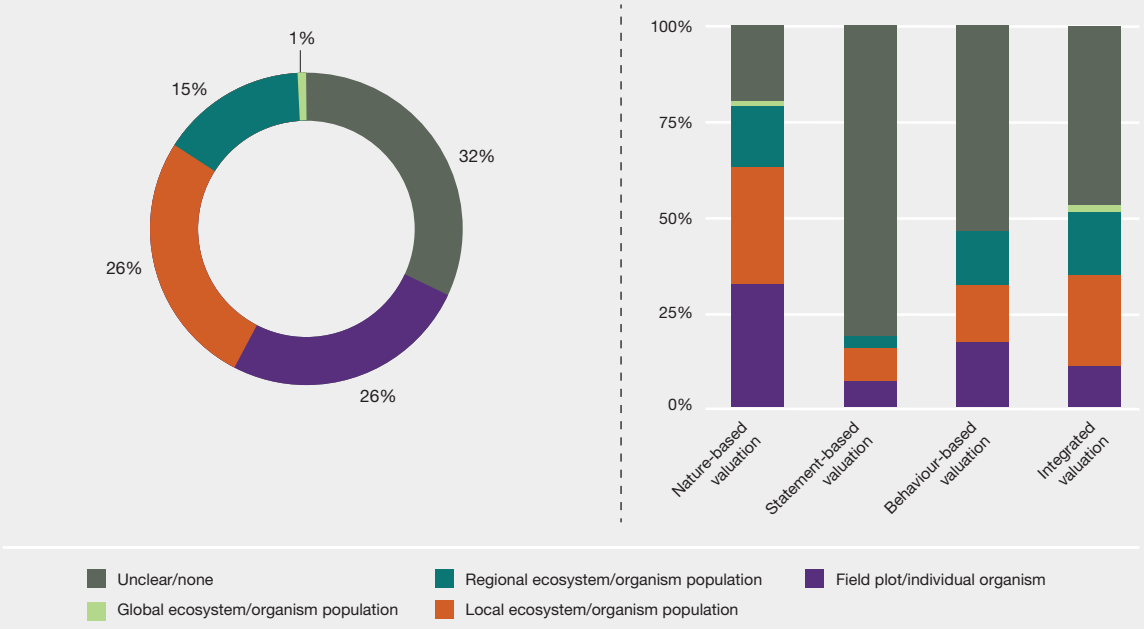


Figure 3 12 **Biophysical scale at which valuations were performed.**

On the left, percentage abundance of valuations; on the right, distribution per method family (systematic in-depth review n=1163). Note that valuations often do not focus on a biophysical scale, but for example on the values of a social group or community.

example, were mostly applied to forest systems and were less likely to be used in urban environments.

Valuations have been conducted at multiple spatial scales, although approximately one third of the reviewed studies do not specify the biophysical scale to which the values relate. Valuation studies that assess specific biophysical properties tend to do so at all scales from very local up to regional ecosystem scales **(Figure 3.12 left)**. Statement-based valuation studies were the least likely to report on the biophysical scale of the study **(Figure 3.12 right)**. This is to be expected given that statement-based methodologies do not necessarily require linking people's values to biophysical locations, flows or stocks (see 3.2.2.2).

The valuations are however clear on the administrative or policy scale the valuation is relevant for. It is very clear that the practice of valuation and therefore the experiences to draw from in decision-making have been predominantly generated at the sub-national scale (see **Figure 3.13**). The evidence also shows that this is the case across all method families.

3.2.1.1 Reasons (purposes) for valuation

It has been suggested in the literature that valuations have fallen short of their often-cited intentions to enable decision-making to account for the values of nature (e.g., Laurans *et al.*, 2013). To evaluate the evidence for this, we applied Laurans *et al.*'s (2013) classification system of decision-making purposes based on the intended use of the valuation: i) providing information ("informative"); ii) assisting with prioritisations ("decisive"); and iii) designing technical features of policies ("technical") (see 4.6).

The most frequently reported purpose of valuation is informative **(Figure 3.14)** followed by decisive purposes indicating that valuations are frequently aimed at providing decision-makers with recommendations about the most desirable course of action. Nonetheless, studies rarely report using valuation procedures actively in decision-making processes suggesting that the recommendations they provide may not actually be channelled into real decisions (see 4.6 for further analysis of uptake of valuation). Finally, few studies report on the use of valuation to design policy instruments *(technical purpose)*. This somehow contrasts with the academic focus on correction of externalities through economic instruments, which have justified the development of many of the valuation methods over the last few decades (see 3.2.2.2, 3.2.2.3). A slightly higher fraction of studies conducted having technical design purposes are from statement- and behaviour-based valuations, however, variations across method families are small.

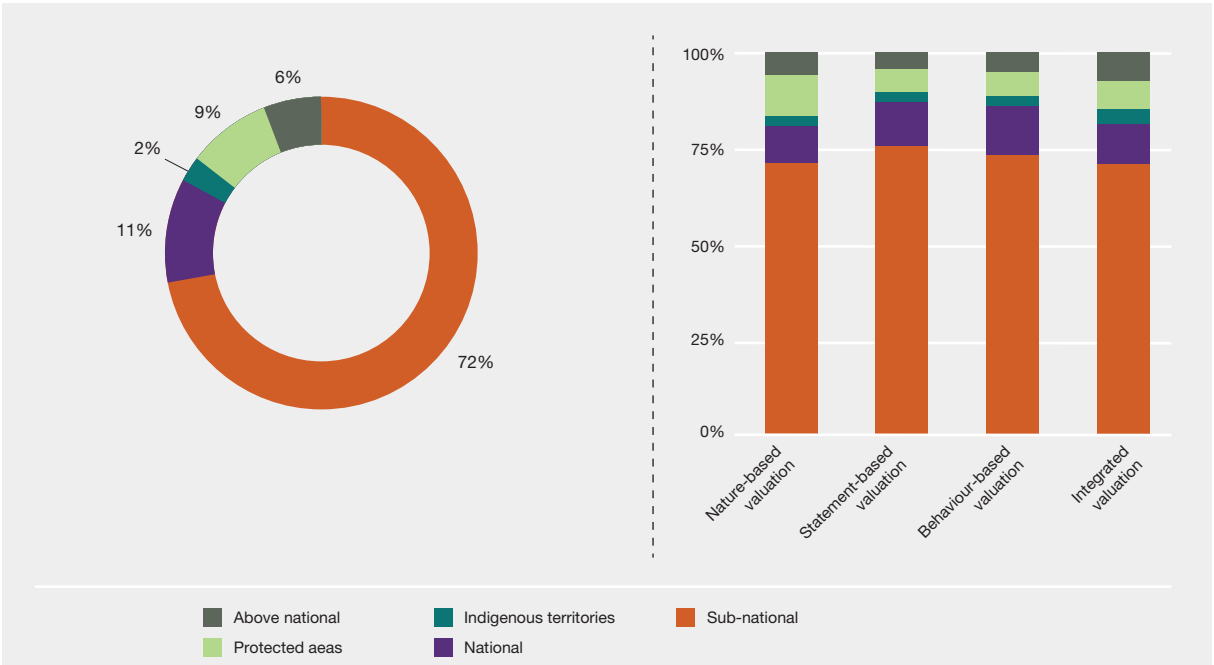


Figure 3 13 **Valuations per administrative scale.**

On the left, percentage abundance of valuations, on the right, distribution per method family (systematic in-depth review n=1163). Scale includes overlapping categories in order to capture both spatial biophysical and administrative aspects (including IPLC designations).

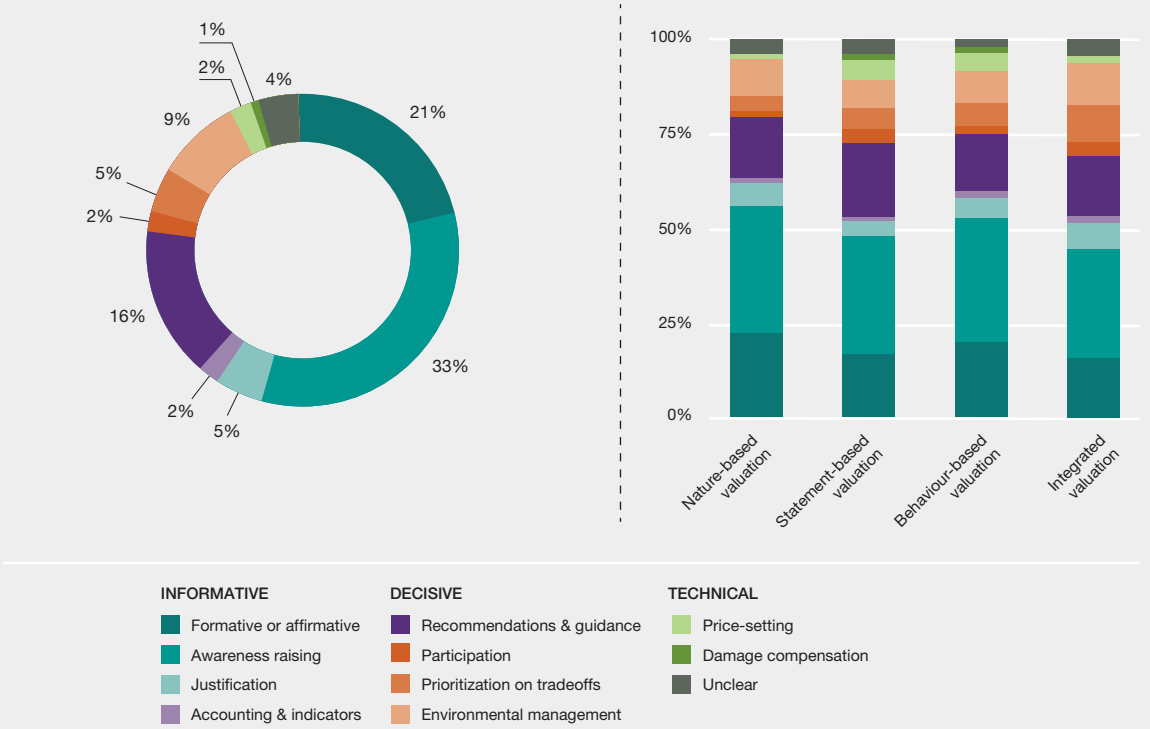


Figure 3 14 **Stated purposes of valuations.**

On the left, percentage abundance of valuations, on the right, distribution per method family (systematic in-depth review n=1163). Note that actual uptake or use is largely unreported.

3.2.1.2 Which values and whose values are assessed

Nearly half (46%) of the valuation studies assess nature's contributions to people (material and non-material), 33% assess nature itself or the maintenance of options, whereas 28% of the studies we reviewed assessed some aspects of quality of life **(Figure 3.15)**.

This review does not assess the concept of disservices or negative nature relations *per se*, although the valuation literature assessed does inherently include value indicators of negative nature relations (such as through costs and damages). Most valuations report on the positive contributions of nature to people and societies. A substantial proportion of valuation studies, however, reported on the undesirable dimensions of nature-human relations. For example, studies among those selected for the systematic literature review report on human-wildlife conflicts in communities residing inside and around conservation areas, predominantly in sub-Saharan Africa (crop raiding primarily) but also in the United States of America and Latin America (ranchers versus wolves and mountain lions). Several studies highlight the real or perceived danger posed to human lives by residing in close proximity to wildlife and the damage to human property it can cause. There are also some urban ecology studies testing links between urban tree cover and urban wildlife to infrastructure damage, human health impacts (asthma and plant-related volatiles), crime and injustice.

Whether implicitly or explicitly, all valuation studies – including nature-based valuations – manifest the values of 'someone' (individuals or specific groups). However, in over half of the studies, authors do not explicitly associate values with people **(Figure 3.16)**. Valuations that explicitly assess the values of people mainly elicit values from individuals and households and to a lesser extent the values of groups/communities or societies as a whole.

The way in which people are included in valuation has evolved over the last decades in line with the general increased focus on stakeholder participation. Participatory processes are those where actors or stakeholders (i.e., individuals, groups or representatives of organisations) have an active role in decisions that are relevant to them (Reed, 2008). Participatory approaches differ in terms of the level of participation they provide, the role of participants, and the extent to which participants can impact on decisions (Carnoye & Lopes, 2015). Methodologically, this has led to an expansion of the methods used in valuations, including the incorporation of participation in traditional

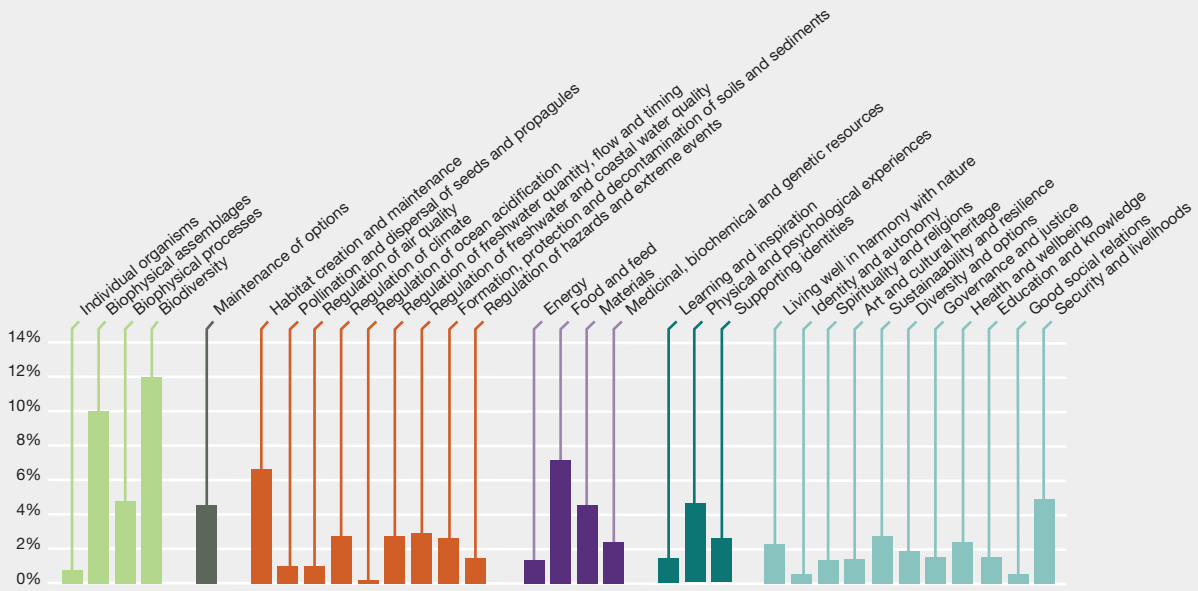


Figure 3 15 **Relative abundance of various valuation targets (systematic in-depth review n=1163).**

Classification following as in Europe and Central Asia Assessment (IPBES, 2018), colours according to targets of nature itself, nature's contributions to people (regulating, material, non-material) and good quality of life categories.

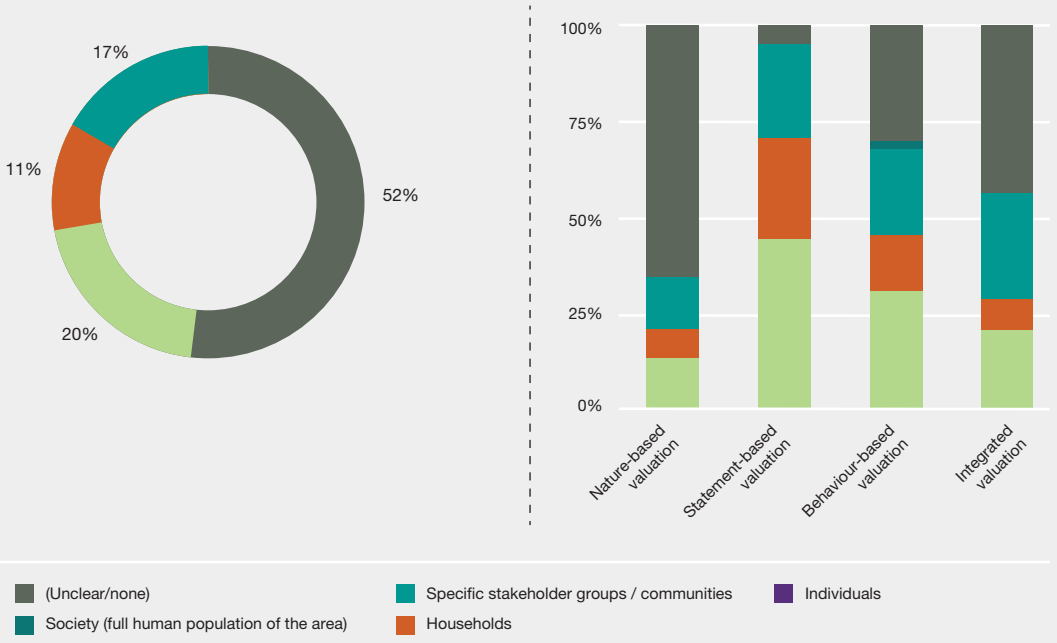


Figure 3 16 **Social scale at which valuations were performed.**

On the left, percentage abundance of valuations, on the right, distribution per method family (systematic in-depth review n=1163). Note that valuations often do not focus on a social scale, e.g., when focusing on a habitat or species.

appraisal techniques such as participatory mapping (Brown & Fagerholm, 2015; Brown & Kyttä, 2018), participatory modelling (Fontaine *et al.*, 2014), participatory scenario planning (Oteros-Rozas *et al.*, 2015), participatory choice experiments (Maldonado *et al.*, 2019), and participatory multi-criteria analysis (Garmendia & Gamboa, 2012; Stirling, 2006). Some methods are participatory by design, including deliberative methods such as citizen juries (Brown *et al.*, 1995), participatory (action) research (Sieber *et al.*, 2014), rural appraisal (Chambers, 1994) and focus groups. Other

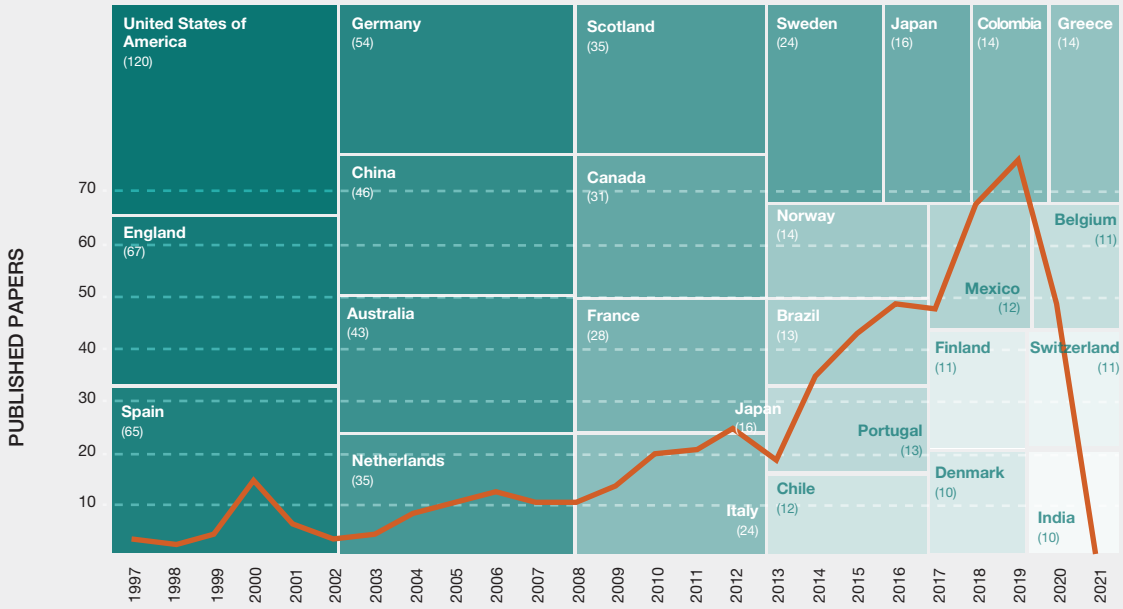


Figure 3 17 **The number of studies reporting on participatory valuation of nature in the academic literature have increased substantially over the last 25 years, most notably since 2014 (web of science search on participant* AND valuation AND environment*).**

Most such studies have been conducted in just a few countries. (Only countries with 10 or more studies are reported).

Box 3 1 The role of nature valuation in the management, resolution and transformation of socio-environmental conflicts.

Socio-environmental conflicts are the result of disputes between social groups about decisions concerning the natural environment or disagreements on the ownership, access, and distribution of costs and benefits derived from nature's transformation (Herrera *et al.*, 2017; United Nations *et al.*, 2015). Conflict resolution refers to the wide spectrum of strategies that are available to manage and resolve conflicts (Ramsbotham *et al.*, 2011).

Methods for articulating and assessing values can facilitate conflict resolution and transformation processes by characterising how the social groups involved perceive the world and by providing information about values for a constructive dialogue between the parties. It should be noted, however, that the application of valuation methods is only one of several other methods and approaches that are essential in the complex and sometimes long process of conflict resolution and transformation (Table 3.3). Among the valuation methods that are suited for use in conflict analysis, worldview assessment, framing analysis, consensus analysis, and ethical analysis are powerful methods that can be used to understand the stakeholders (For descriptions of these methods, see 3.2.2.2). Participatory multi-criteria decision-making analysis can be applied with conflictual parties to help make explicit the range of values involved, the dimensions of well-being that are manifested and to begin exploring scenarios for the resolution of discrepancies (see 3.2.2.4). Deliberative approaches, with their strong emphasis on reaching consensus through discussion and reflection about individual and collective preferences allow expressed values to be articulated and their inter-relations explored. Conflict analysis can also draw from nature-based valuation methods to quantify and characterise the components of nature that are contributing to the conflict and their distribution across parties, and to ultimately inform the process and outcomes of agreements.

Box 3 1

Table 3 3 **Examples of methods that can be used to address conflict across conflict resolution stages.**

Conflict analysis	Stakeholder engagement	Negotiation/ Resolution/ Management/ Transformation	Description	Reference
Worldviews assesssment			Understanding the worldviews of the disputing parties helps to understand the different positions from which they interpret, enact and co-create reality. The assessment of worldviews has been used to explain pro-environmental behaviour, and there are few applications to the analysis of socio-environmental conflicts.	Hedlund de Witt *et al.*, 2016; Hedlund-de Witt, 2012; Hedlund-de Witt *et al.*, 2014
Framing analysis			Understanding frames is important for mediators of conflicts, as this allows them to intervene with a clearer insight on divergences and convergences, to find potential common ground, and to propose alternative accounts of conflicts in ways that disputants can subscribe to.	Brummans *et al.*, 2008; Davis & Lewicki, 2003; Asah *et al.*, 2012
Consensus analysis			It can potentially be applied to 'characterize variation in environmental beliefs across various stakeholder groups that will help in facilitating an understanding of common and contrasting conceptions and values' (Emery & Oughton, 2011, p.19). The analysis mainly provides inputs to identify opportunities for the construction of social agreements or public policies (Hung & Yang, 2006).	Carothers *et al.*, 2014; Horowitz 2009; Miller et al, 2004; Stone-Jovicich *et al.*, 2011; Swora 2003; Van Holt *et al.*, 2010; Hung & Yang 2006; Stone-Jovicich *et al.*, 2011; Hung & Yang 2006.
Ethical analysis			Ethical participatory assessment expands upon pre-existing methods by opening them up to more effective bottom up deliberation through reflecting upon ethical aspects of a public decision.	Gritten *et al.*, 2009; Nylund & Kröger 2012
Multicriteria decision analysis			Decision support tool that allows the disputing parties to account for multiple dimensions of well-being, create different scenarios and deliberate on the best options.	Davies 2013
Deliberative valuation methods			Disputant parties go through a process of discussion and reflection to form preferences beyond self-interest (Dietz *et al.*, 2009), consensus opinions (Murphy *et al.*, 2017; Palomo *et al.*, 2011a), generate trust, and increase social support for policy decisions (Bunse *et al.*, 2015; Parks & Gowdy, 2013).	Rauschmayer 2006

methods do not require the subject to interact with other study participants, but they do allow for individuals to have more say in what and how they share information with valuators, such as with diary keeping and story-telling methods (Chambers, 2009).

Since the second half of the 20th century, participatory practices have increasingly been used in urban planning (Hisschemöller, 2018), natural resource management (Johnson *et al.*, 2016), community-based management (Wiber *et al.*, 2004), climate change (van Aalst *et al.*, 2008), energy futures (Kowalski *et al.*, 2009), technological development (Cuppen, 2012, 2018), Nature-based solutions (Palomo *et al.*, 2021), environmental decision-making (UN, 1993), Global Water Partnership (2000) and others (Chilvers & Kearnes, 2016; van Asselt Marjolein & Rijkens-Klomp,

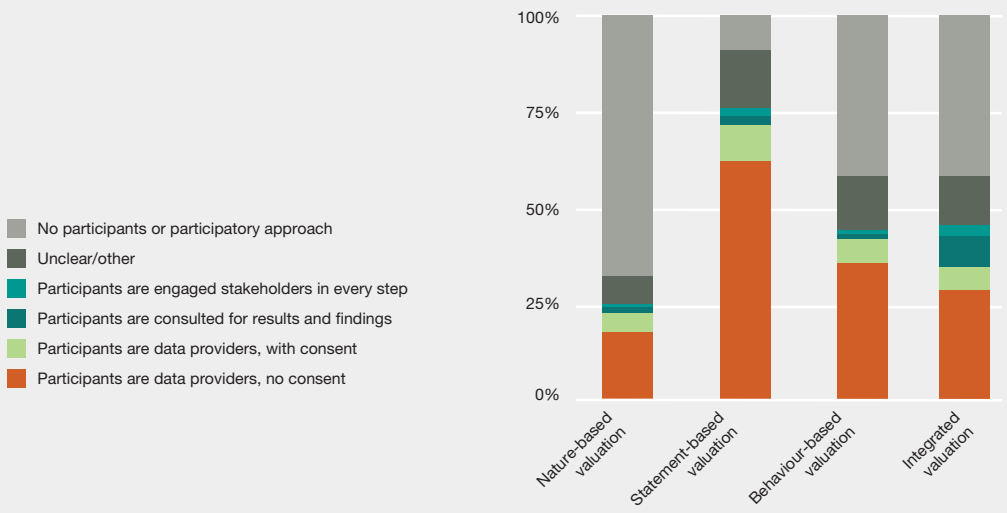


Figure 3 18 **Levels and types of stakeholder engagement in valuation studies.**

2002). Participatory approaches have shifted towards allowing more diverse types of co-production and citizen-led processes informed by a diverse set of knowledge systems and disciplines (Fontaine *et al.*, 2014), incorporating issues of democratisation (Habermas, 1999), legitimacy and other good governance criteria; (Barnaud & van Paassen, 2013), inclusion (Elias *et al.*, 2017), complexity (Reed, 2008) and diverse values (Lo & Spash, 2012).

Participatory processes, – especially those where actors engage in dialogue – seek to fulfil different purposes, including increasing awareness and learning (before making decisions), addressing conflict and seeking consensus (Brown & Raymond, 2014) **(Box 3.1)**, generating situated understandings (Ungar *et al.*, 2020), or policy design (Kallis *et al.*, 2006; Wesselink *et al.*, 2011). Despite these claims, the uptake of results of participatory and co-production processes by decision-making remains limited (Turnhout *et al.*, 2020; Wesselink *et al.*, 2011).

Among the 1163 valuation studies that were reviewed in Chapter 3, nature-based methods were the least likely to involve stakeholders followed by behaviour-based and integrated methods **(Figure 3.18)**. On the contrary, about one third of statement-based valuation involved stakeholders to some extent. Across all method families, the most common form of stakeholder participation was as active and conscious data providers who had given their consent. This form of stakeholder participation is considered low-level participation since stakeholders' agency to affect the valuation process and their contribution to it is limited (Fontaine *et al.*, 2014). Integrated valuations were more likely to provide agency to stakeholders by engaging them in all steps of the valuation process. Only 2% of studies consult stakeholders on findings and 1% involve them in every step of the valuation process. Across all methods families, a fair number of studies either failed to report on or were unclear about their stakeholder engagement strategies if any.

3.2.2 Assessment of valuation methods

Comprehensive reviews of valuation methods and approaches that are applicable to biodiversity and nature's contributions to people are scarce. Valuation method reviews focused on either one aspect of nature from multiple methodological perspectives or multiple aspects from one methodological perspective. To review the wide range of existing methods covering the scope of chapter, we organise the review and assessment of methods following the methods family typology (see 3.1.2.2)[19].

3.2.2.1 Overview of nature-based valuation methods

Nature-based valuation methods are methods that gather or analyse observations of (changes in) biophysical properties of nature with the aim to inform decision-making on nature. These include observations on species, ecosystem structures and processes, but also landscape, topography, soil, water and air. Nature-based valuations play a central role in making socio-economic analysis more robust (Chan & Satterfield, 2020; Ferng, 2007; Wang *et al.*, 2017).

19. Systematic review on method families (https://doi.org/10.5281/zenodo.4404436).

Box 3 2 Ecosystem services valuation.

Ecosystem service valuation, in the sense of this valuation chapter, covers aspects of the different valuation method families discussed in this chapter, and thus represents an essential cross-cutting theme.

Valuation of ecosystem services aims to better understand the importance of ecosystems to human wellbeing. The ecosystem service concept dates from the late fifties and was re-introduced in the 1977 paper of Walter Westman titled "How Much Are Nature's Services Worth" (Baveye *et al.*, 2013). During the 1980's, the field of 'ecological economics' emerged (e.g., Ehrlich & Ehrlich, 1981) and argued for valuation of ecosystems based on biophysical properties, inspired by classical economics theory of value based on costs of production. In the nineties, the concept gained further traction and diverse methodologies to assess ecosystem services were developed, either based on biophysical properties of ecosystems or on people's preferences, perceptions and behaviours (e.g., Costanza *et al.*, 1997; Daily, 1997; Hanley *et al.*, 1998).

The main critiques revolve around the adopted valuation methods and the theoretical inconsistencies with economic value concepts (see e.g., Pearce, 1998). In short, economic valuations are based on changes in economic welfare resulting from marginal changes to ecosystems. Such values are context-dependent and will vary with any (non-marginal) change in the state of the ecosystem or socio-economic system (Turner *et al.*, 2003). Therefore, estimating "total" economic value of the Earth's ecosystems was argued to be unsuitable for public policy advice about relatively modest changes to economic and ecological systems (Bockstael *et al.*, 2000). The calculations did however succeed in raising awareness of the economic significance of ecosystems and stimulated further research in environmental valuation.

In terms of scientific publications, since the millennium ecosystem assessment (2005) and the economics of ecosystem and biodiversity study (2010) the field has grown exponentially in the United States, the United Kingdom and China, while papers from the global south remain virtually absent (McDonough *et al.*, 2017). While environmental sciences and agricultural and biological sciences are the ones that account for the largest number of publications (McDonough *et al.*, 2017), an increasingly large and diverse set of ecosystem service-valuation methodologies emerged from multiple scientific fields (including geography, environmental psychology, economics, human geography, sociology, political science, etc.). At the same time, the policy-oriented vision has stimulated collaboration and integration of different approaches on concrete real-life valuations (Jacobs *et al.*, 2016), which has led to the increasing application of socio-cultural valuation approaches as well as to the higher frequency of mixed-method approaches that integrate biophysical, economic and socio-cultural approaches (Martín-López *et al.*, 2019) and an increasing attention for approaches to value nature used by indigenous peoples and local communities (IPLC).

These advances are reflected in the conceptual framework of IPBES, which rebranded the concept to 'Nature´s Contribution´s to People' (Díaz *et al.*, 2018; Pascual *et al.*, 2017), to better emphasise diverse worldviews, relational values and fluid reporting categories (Kadykalo *et al.*, 2019). Different frameworks are needed for the global policy audience, to enable a stimulating and constructive dialogue among diverse disciplines, from ecology to social sciences, on how nature underpins human quality of life and how this can be valued in decisions (Díaz *et al.*, 2020).

However, several challenges for ecosystem services valuation prevail. One challenge is the prevalence of valuations without appropriate biophysical grounding (Chan & Satterfield, 2020). Also, while integration of ecosystem service data within economic valuation and accounting systems represents clear opportunities (de Groot *et al.*, 2022), the connection of ecosystem services valuation with policy questions and decision-making institutions needs improving (Bouma & van Beukering, 2015; Schaefer *et al.*, 2015; Schröter *et al.*, 2014). Additional challenges are to move beyond national assessments towards the impacts of international flows (Pascual *et al.*, 2017; Schroeter *et al.*, 2018), as well as inclusion of diverse worldviews (Hobern *et al.*, 2019; McElwee *et al.*, 2020).

Nevertheless, the field of "valuation of ecosystem services" is regarded as one of the major advances within sustainability science in the last three decades (Chan & Satterfield, 2020), with a pedagogical aim to demonstrate human´s dependence on ecosystems, and to identify solutions to the current environmental crisis (Clark & Harley, 2020) for example by regarding future decisions of land use change, to provide better outcomes for humans and nature (Bai *et al.*, 2018; Bateman *et al.*, 2013; Goldstein *et al.*, 2012) and support the systemic change that is needed (Dasgupta, 2021).

Nature-based valuations- as that which is today practised in western science academies- have roots that go back to early records of the natural world[20]. Some of the early works can be traced to early philosophers and natural historians (40 AD to 1800s) who are recognized for having had a key role in the development of western scientific inquiry by asking questions about nature, natural phenomena, including technology and humanity. Ultimately, however, all cultures – large and small – have long histories of studying nature and its components and philosophising about human-nature relations. We acknowledge the bias towards western science contributions to nature-based valuation presented in the next paragraphs and subsequent sections.

20. Historical development of nature-based valuation methods (https://doi.org/10.5281/zenodo.4422075).

Natural history, as a field of study in Europe, inspired centuries of scholars to document the natural world by accumulating large collections of exotic specimens and developing systems to categorise them into taxonomic groups (Wulf, 2015). The observations, theories and writing of Alexander von Humboldt of his travels to South America in the early to mid-19th Century laid the foundation for subsequent explorations by renown European natural historians including English naturalists Henry Walter Bates, Charles Darwin, and Alfred Russel Wallace (Helferich, 2011; Morrison, 2016).

Their work gave birth to biology as a theory-informed science and provided the early foundations for western conservation science (Swart *et al.*, 2001). The field introduced many of the concepts used in nature valuation today that make explicit the importance of nature in decision-making (Williams, 2014) such as the concept of "keystone species", defined as species with a pivotal role in structuring ecosystem processes (Paine, 1969); "biodiversity hotspots" as areas for priority conservation planning and "threatened species" as species deserving special conservation attention (Swart *et al.*, 2001). The role and contribution of IPLC to these efforts is increasingly being acknowledged and critiqued, however, given that this extractive mode of working with local communities and knowledge holders persists in modern day valuations of nature (see 3.2.4).

While nature-based valuation methods have been applied mostly to measure and assess values of nature, such as (fertile) soil, (productive) forest, (pure) water, (rare) minerals, as well as ecosystems, biomes, species, and ecosystem functions and processes, they have a long history in supporting decision-making on management of natural resources. More recently, their application on concepts such as nature's contribution to people and ecosystem services is helping to make the link between nature and people's quality of life more visible and easier to understand (Hammer *et al.*, 2018). The importance of nature to deliver contributions to humans is well-recognized (IPBES, 2019a). Specifically, ecosystem service mapping is an assessment method that has received a lot of attention due to its clear links with spatial planning (Albert *et al.*, 2016) **(Box 3.2)**.

Due to the diversity of values of nature, a broad set of tools and methods have been developed to value biophysical phenomena **(Table 3.4)**. Some of them can be used for several purposes and in different ways, which makes discrete categorization difficult. Indeed, many projects

Table 3 4 **Examples of tools and methods in nature-based valuation. (See more complete list in Annex 3.4).**

Approach	How data are collected or generated	Examples of methods
Direct measurements	• Field observations and measurements (in situ/ex situ) • Inventory /statistics	• Species' lists & inventory • Vegetation surveys • Biophysical data collection • Biodiversity monitoring
Stakeholder consultations	• Data is collected from resource users or those are knowledgeable about the nature phenomenon	• Resource use surveys • Interviews • Delphi Methods • Expert consultation
Spatial Analysis and Mapping	• Direct ground-based mapping • From satellites, aircraft, ships, drones, and other remote-sensing and on-site measurements. • Normalized difference vegetation index (NDVI) • Enhanced vegetation index (EVI) • Information provided by consultations with resource users, local stakeholders and experts	• Species distribution & biodiversity hotspot mapping • Gap analysis • Participatory mapping of different attributes of nature and ecosystems • Habitat suitability analysis • Ecological importance • Forest cover estimation and forest structure analysis • Vulnerability, resilience and adaptation assessment • Least cost corridor analysis • Unmanned aerial vehicles for monitoring of biota
Modelling	• Primary or secondary sources of data • Often uses combinations of data sources collected using the methodologies mentioned above	• State and transition models • Phylogenetic analysis • Modelling and simulation of agricultural systems or productivity • Hydrological/climate modelling

and experts present different categories of methods depending on the data needed, the process used or even the types of results or final use. **Table 3.4** presents the main characteristics of the major nature-based methods groups identified from the literature review[21]. As mentioned above, the boundaries among these groups are not rigid and many overlaps occur. Among the decision-making processes these methods inform are e.g., conservation prioritisation, planning & management, resource extraction planning (e.g., through stock assessments), agricultural development (genetic material, pollination services, soil fertility), conservation programme development, legal and voluntary compliance (e.g., through water and air quality monitoring), climate change mitigation & adaptation, infrastructure development (e.g., impact assessments).

Challenges and potentials in nature-based valuation

The choice of what to measure biophysically is informed by cultural principles, contexts and worldviews (see Chapter 2). It is simultaneously a proxy of ecological importance that can be further assessed for its socio-cultural or economic importance or directly inform decisions. For instance, the decision to measure the abundance of a red listed species in a certain area can lead to legal protection of the area. Therefore, the choice of what is (not) measured or valued has "normative, value-laden dimensions", even when the valuation itself is an objective measurement (Bresnihan, 2017) (see Chapter 2). A review by Crossman *et al.* (2013) on ecosystem services showed that, out of 113 mapping studies, 32% mapped only one ecosystem service, even though other services existed. Emphasising one aspect without considering the whole system can have, and has had, damaging consequences (Bresnihan, 2017; Everard & McInnes, 2013; MEA, 2005). A growing number of studies explicitly consider multiple aspects of nature, ecosystem services belonging to different categories, bundles of ecosystem services or synergies and trade-offs, which is essential to guide decision-making to avoid biases towards specific ecosystem services, and to include potential linkages and feedbacks between them (Crouzat *et al.*, 2016; Spake *et al.*, 2017). Despite the growing body of literature, synergies and trade-offs remain poorly understood, however (Filyushkina *et al.*, 2016; Haase *et al.*, 2014; Seifert-Dähnn *et al.*, 2015).

Different methods used to measure an aspect of nature often yield different results and have different implications for policy. There is a debate as to whether a diversity of approaches will support advancement (Seppelt *et al.*, 2012), and meet the diverse demands reflected by the heterogeneity of socio-ecological systems and contexts, or whether the discrepancies in the spatial patterns of mapped and modelled ecosystem services yielded by the various methods will create confusion over which method is the most accurate (Andrew *et al.*, 2015), hinder comparability (Bagstad *et al.*, 2013), and hamper evidence-based decision-making. Palomo *et al.* (2018) confirm that one of the main bottlenecks related to the mapping of ecosystem services is the selection of methods. Tiered mapping approaches, decision trees (e.g., ValuES), and guidelines for standardised mapping and measurements of ecosystem services are potential solutions for map-makers, while platforms for methods documentation and comparison could be developed to help end-users (Palomo *et al.*, 2018).

Scaling issues – Scale is defined as the physical dimensions, in either space or time, to which any nature-based valuation or assessment of the biophysical world applies. Scale is often loosely defined to include issues of extent, duration, resolution, grain and hierarchical level. Scale is a key issue in any nature-based valuation, assessment or measurement of nature, nature's contributions to people or ecosystem services. Issues of scale are associated with the fact that nature's contributions to people or ecosystem services are supplied, used, valued and managed at different spatial and temporal scales. For example, the spatial or temporal scale at which the processes of nature operate or function (to produce nature's contributions to people or ecosystem services) generally do not overlap with the scale at which those processes are managed or valued by humans (Willemen, 2020). Such an example of spatio-temporal mismatch has been illustrated in relation to the supply of fresh grass for essential oil production in South-Africa which varies in space and time, while its management occurs uniformly throughout the studied area (del Río-Mena *et al.*, 2020). In general, scale effects are still poorly considered (Lavorel *et al.*, 2017). The scale of any study should be determined by the end user and correspond to the scale of the decision to be made (Lavorel *et al.*, 2017).

Some models and tools are particularly well-suited to specific local contexts and results of their applications in different contexts are not made to be compared. The disadvantage is that they might not fit within common decision frameworks (Bagstad *et al.*, 2013). As Bagstad *et al.*, (2011) mention, this trade-off is partly related to scale: some generalised models may be highly effective at a national level but ineffective at the local level. Malinga *et al.*, (2015) found that a majority of studies are performed at the municipal and provincial levels (i.e., intermediary scale), and two-third of studies used a fine spatial resolution of one hectare or less. An alternative strategy might be to cross-compare policy findings of place-based studies rather than applying fully harmonised generalised concepts and methods and foregoing the local context-specific relevant features (Balvanera *et al.*, 2020).

However, scaling will remain a partly unresolvable challenge. Often, a combination of spatial data available at different

21. Systematic review on method families (https://doi.org/10.5281/zenodo.4404436). See nature-based valuation.

spatial resolutions (e.g., from different satellite sensors), in different geographic information systems formats (e.g., raster vs vector), or covering different spatial extents are used for nature-based valuation (e.g., land use data, habitat suitability maps, or species observation data). Depending on the spatial resolution, data from different sensors for example will likely give different ecosystem services or nature's contributions to people estimates for a given area (de Araujo Barbosa *et al.*, 2015).

Data quality – Biophysical assessments used in valuation, especially ecosystem service-mapping studies, often derive their results from unvalidated secondary data of variable quality, e.g., land cover used as proxy instead of biophysical observations or measurements (Martínez-Harms & Balvanera, 2012; Seppelt *et al.*, 2011). The values (or indicators) developed in such studies are largely hypotheses of relationships between the biophysical data at hand and the ecosystem services of interest (Andrew *et al.*, 2015) which have rarely been tested (Martínez-Harms & Balvanera, 2012). There is a clear need for more validated maps and models (Schägner *et al.*, 2013). In addition, few studies explicitly address and communicate uncertainty (Hamel & Bryant, 2017; Lavorel *et al.*, 2017), as well as detailed information on specific methods used to assess ecosystem services (Bagstad, *et al.*, 2013b; Seppelt *et al.*, 2011).

Land cover data is the most common input for ecosystem service mapping and modelling (Andrew *et al.*, 2015). A given indicator is often attributed to each land cover / ecosystem service combination, irrespective of specific location characteristics, using, e.g., expert knowledge. While this has the advantage of being a relatively fast assessment, it may result in a poor fit of ecosystem service estimates (Burkhard & Maes, 2017; Martínez-Harms & Balvanera, 2012). The relationship between land cover and ecosystem service supply still has to be tested in most regions of the world (Martínez-Harms & Balvanera, 2012).

Ecological production functions, on the other hand, are quantitative models of ecosystem services that use measured ecosystem properties. These models make greater attempts to mechanistically estimate the supply and flows of ecosystem services (Andrew *et al.*, 2015) but demand more resources. Also, despite their prominence in ecological studies of ecosystem services, providers of ecosystem services (Kremen, 2005) are rarely used for the mapping of ecosystem services, although they could be useful indicators of ecosystem services supply (Andrew *et al.*, 2015). Statistical models based on field data should also be used more frequently (Martínez-Harms & Balvanera, 2012). In general, how specific indicators are linked to ecosystem services and nature's contributions to people remains an important issue, and an indicator's capacity to describe a specific aspect of ecosystem services and nature's contributions to people varies across space and time (Haase *et al.*, 2012).

Costs of conducting nature-based valuation

Academic literature rarely provides information about the cost of methods either in terms of finance, time or human resources and the implications of different approaches (e.g., participatory vs non-participatory monitoring) on costs of undertaking a study. For some methods (e.g., biodiversity monitoring) costs can be inferred from the type of expertise needed (e.g., low or high technical skills), the costs of the tools used and the time required to undertake the study. However, given that tools are rarely used exclusively for one study and that human resources can be spread across multiple tasks that are not reported in studies, cost estimates based on valuation reports can easily be over or under-estimated.

Additional factors that can affect the costs of undertaking nature valuation: i) difficulty in establishing methodological comparisons because methods are often developed to address specific problems/issues (Hernández-Morcillo *et al.*, 2013; Winthrop, 2014); ii) costs derived from quality control and repeatability of methods (Winthrop, 2014); iii) costs associated to time and financial needs in data collection at the spatial and temporal scale required (Ambrose-Oji & Pagella, 2012; Kumar *et al.*, 2021), and iv) costs and resources needed to develop and maintain the nature valuation tools and training staff (Bagstad *et al.*, 2013).

3.2.2.2 Overview of statement-based valuation methods

Statement-based valuation methods directly ask people to express their values either verbally, in writing or through other actions solicited by the valuation process e.g., ranking components of nature or indicating preferences (Carson, 2018; Tinch *et al.*, 2019). As such, the methods in this family generate information *directly from participants* of the diverse ways in which they perceive and value nature. The responses obtained can be used to describe values held and to quantify and qualify people's interactions with nature, nature's contributions to people and nature-derived wellbeing (Cheng *et al.*, 2019; Díaz *et al.*, 2015; Johnston *et al.*, 2017). Valuation participants can state their values as economic or social-political agents or both (Blamey *et al.*, 1995; Nyborg, 2000).

The earliest form of statement-based valuation was contingent valuation (Davis, 1963), although the use of values elicited from statements in public policy debates remained scant for decades (Kling *et al.*, 2012). After the Exxon Valdez incident in 1989, however, where court cases determined the compensation for oil spill damages of remote wilderness areas in Alaska (for details see Exxon

Valdez Oil Spill Trustee Council, 2008) interest in estimating the value of public goods for similar decision-making purposes was spurred. For example, a panel of experts was brought together to assess if results from a contingent valuation could be used as evidence to determine damages to nature (see National Oceanic and Atmospheric Administration (NOAA) documentation (e.g., Arrow *et al.*, 1993)). Over the following decades the methods have been refined and now also include methods using other value indicators (e.g., Hegetschweiler *et al.*, 2017; Nesbitt *et al.*, 2017) and also methods based on group elicitation. This family of methods includes the so-called stated preference methods developed in economics (I. Bateman *et al.*, 2002), some preference-based methods and many "socio-cultural" valuation techniques that are often used to evaluate non-material nature's contributions to people (Hernández-Morcillo *et al.*, 2013; Scholte *et al.*, 2015).

Statement-based valuation can range from highly structured to unstructured approaches. Structured methods collect a fixed set of value information descriptors (e.g., by using structured questionnaires). In unstructured and/or exploratory methods value indicators of interest are not a priori defined (e.g., ethnographic and narrative interviews). These methods generate quantitative and qualitative data, allowing for the application of analytical as well as interpretative methods (Hernández-Morcillo *et al.*, 2013). Moreover, the valuation process can be designed primarily by those whose values are assessed, be co-created, or fully controlled by the valuator.

For the purpose of this overview, the methods and approaches in this group are subdivided into two types: methods that elicit values from individuals and those that elicit values from groups of people (Wolff *et al.*, 2015). This grouping focuses on the elicitation process (i.e., how information is generated) which is also the basis for identifying the limitations of statement-based methods (see 3.3.2.2)[22].

Individual-based approaches

In individual-based methods, a researcher, possibly in collaboration with the *respondent*, collects statements on values, and in qualitative or quantitative format, from individuals, through questionnaires, interviews or other data collection methods and instruments. Individual-based methods can be useful for multiple purposes, for example: when individual rather than group-formed values are of interest, when group-sessions would restrict individuals (for reasons of privacy, sensitivity or otherwise) from expressing their views, where policies are evaluated based on outcomes at individual or household level, or where individuals hold specific knowledge, views or positions requiring in-depth individual engagement. Interviews and questionnaires are the most widely used approach for generating information about values of people for nature's contributions to people/ecosystem services (see 3.3.3). Brook & McLachlan (2008) also find that more than 60% of ecological and conservation research and monitoring studies conducted in IPLC contexts, used interviews to document ILK (Brook & McLachlan, 2008).

Methods using surveys include a range of specific valuation procedures such as contingent valuation (De Boer & Baquete, 1998), (discrete) choice experiments, and contingent behaviour (Christie, 2007). In the context of monetary valuation, these specific methods are known as "stated preferences" methods (Bateman *et al.*, 2002; Johnston *et al.*, 2017). These methods circumvent the absence of markets for certain environmental goods and services. They present respondents with hypothetical markets or hypothetical policy options where they have the opportunity to choose or to *buy* the goods in question and state their preferences (Bateman *et al.*, 2002). Within monetary valuation, stated preference methods have been applied regularly and to many different habitats to value a diverse set of ecosystem services/nature's contributions to people (Hanley & Czajkowski, 2019; Schmidt *et al.*, 2016). Especially in contexts where (cash) income is limited, but time potentially less so, studies have used time – rather than money – as a numeraire, asking people for their willingness to spend time to contribute to environmental improvements or protection (O'Garra, 2009).

While monetary valuation methods assess preferences and assume these relate to utility, other methods use different well-being indicators. A strand of literature has used questionnaires to assess to what extent differences in indicators such as life satisfaction and happiness can be explained by variation in natural landscapes, features or phenomena (Kweon *et al.*, 2010; Olsen *et al.*, 2019). These include both the positive effects attributed, e.g., to green space (Kweon *et al.*, 2010), as well as the negative impacts of disasters such as floods and storms (von Möllendorff & Hirschfeld, 2016).

Non-economic, quantitative preference assessments (not directly linked to well-being indicators) such as ratings and rankings based on visual representation of nature, ask participants to indicate preferences from a series of photographs manipulated to contain marginal changes in (usually) landscape attributes. Such assessments have been used at least since the 1960s (e.g., Shafer, 1969; Shafer & Brush, 1977) and continue to be an effective statement-based method for conducting valuation (e.g., Häfner *et al.*, 2018).

The Q-method (Q-sorting) (Newman & Ramlo, 2010) is another methodology that has been used to investigate individuals' perspectives on human-nature relationships.

22. Systematic review on method families (https://doi.org/10.5281/zenodo.4404436). See statement-based valuation.

Rather than being randomly sampled from a target population, in Q-method respondents are selected to represent different perspectives, and their ranking of a series of statements is used to determine how different stakeholder groups assess importance (e.g., Zabala *et al.*, 2018). Q-methodology has been used to assess recreational, spiritual and aesthetic values, and sense of place, with very few examples of its use in assessing educational values, knowledge systems, social relations or inspiration with this methodology exist (Cheng *et al.*, 2019).

Interviews can range from highly structured formal discussions to unstructured interactions akin to informal conversations. The most common setting consists of a one-to-one discussion between researchers and respondents. This is considered suitable for collecting qualitative data through open-ended questions, exploring the respondent's life views and their ways of constructing their lives and social worlds, in the present, past and future (Warren, 2004). For example, structured interviews have been used to assess preferences of ecosystem services in agricultural landscapes (Smith & Sullivan, 2014) and mountainous regions (Schmidt *et al.*, 2016). Expert interviews and other expert-based approaches (e.g., using Delphi techniques) also generate information on values obtained through statements and are apt for data-poor environments (Scholte *et al.*, 2015). They can capture all specific value types (i.e., instrumental, relational, intrinsic), and can be used to assess biophysical values (Edwards *et al.*, 2012; Nahuelhual *et al.*, 2014).

Narrative research uses stories to determine narrators' values, such as their sense of place (Cheng *et al.*, 2019). These narratives can be based on multiple data collection methods including interviews (Klain *et al.*, 2014) and short stories (Bieling, 2014). Interviews involve a conversation between participants/narrators and listeners/researchers who – through this conversation – generate meaning of the events or experiences of the narrator (Mishler, 1986). Proponents of narrative approaches argue that they allow for linking across multiple disciplines can provide creative solutions to persistent problems (Squire *et al.*, 2014) and can contribute to shifting environmental attitudes (Knackmuhs *et al.*, 2019).

Group-based approaches

Group-based approaches elicit values through a process that requires the presence of two or more participants with a facilitator. The main feature of group-based methods is that the responses, which could be individual statements or group statements or a mix of those, are all provided through a process where interaction between the participants is an important part of the process. The group interaction can have many benefits, particularly in situations where participants are asked to provide value judgements on issues that are unfamiliar or when the level of complexity of the decision problem is high (further elaborated below). A group-based interaction can sometimes be classified as a deliberative process (Habermas, 1999; Howarth & Wilson, 2006a). However, a deliberative process will require more time and often repeated interaction, and sets stricter conditions on the quality of communication, than other methods using group discussion/elicitation (Schaafsma *et al.*, 2018) (see 3.2.2.4).

Group dynamics can be designed to have minimum interaction and/or deliberation between participants which range from strongly moderated discussions to free-flowing conversations whereby topics are determined by the participants. Group discussions are usually organised around one or more group activities. Focus group discussions is a widely used technique which sociologists and psychologists have applied since the 1940s (e.g., Merton *et al.*, 1956; Merton & Kendall, 1946). Nominal group technique is a structured method for group brainstorming that encourages contributions from all participants and facilitates quick agreement on the relative importance of issues, problems, or solutions. Methods using discussion-based approaches may rely on one or more facilitators who not only moderate the discussion, but whose role is to stimulate interaction and exchange between participants (Epstein & Leshed, 2016). The methods can elicit individual and/or group-level perceptions and values.

Group-based approaches can address some of the shortcomings of individual-based methods. Due to the emphasis on participants' worldviews, narratives, discourses, expressed values and perceptions, it is often claimed that discussion-based approaches allow for broader legitimacy than non-participatory methods that do not engage with stakeholders (Kenter *et al.*, 2016b). In this vein, it is argued that concepts of justice and equity (distributional, procedural and recognitional) are particularly well adapted to this approach (Beauvais & Baechtiger, 2016; Zafra-Calvo *et al.*, 2017). However, inclusion of stakeholders and the representation of different groups (e.g., IPLC) can be a challenge in terms of time and resources needed (Flynn *et al.*, 2018). Trade-offs must usually be accommodated, and new risks can be introduced when amplifying inclusivity, e.g., concerns regarding the actual representativeness of participants (Boeraeve *et al.*, 2018) or power dynamics between participants (Berbés-Blázquez, 2012) **(Table 3.5)**.

Types of values elicited by statement-based methods

Methods in this family can capture a wide range of specific values and are particularly useful for eliciting values related to non-market benefits and non-use aspects of nature. In value-stating methods, actual behaviour or presence is not necessary: people are (assumed to be) able to state their values for hypothetical/future/past situations (Cheng *et al.*,

2019; Hanley *et al.*, 1998). Techniques in this family are particularly well-suited for assessing the values of current and potential use and demand of nature's contributions to people and nature's contributions to good quality of life (Christie *et al.*, 2012), and broad as well as specific values. These aspects provide a reason for the diverse use of this family of methods. Many monetary valuation methods collect individual utility-based values (such as choice experiments), based on neoclassical utility maximisation assumptions (Tinch *et al.*, 2019). Other valuation methods, both economic and non-economic, have less or no rigid assumptions regarding preferences and use different ethical (non-utilitarian) stances (Hirons *et al.*, 2016).

Although statement-based methods have mostly focused on eliciting instrumental values (Schmidt *et al.*, 2016), several of the methods included (such as contingent valuation and choice experiments) have been used to assess the intrinsic or existence value of nature (Christie *et al.*, 2012). This group of methods can also capture direct use values, option values, bequest values and existence (non-use) values (Turner *et al.*, 2003). It can provide useful information about the economic significance of the lost passive-use values individuals may suffer from anthropogenic activities damaging natural resources and related biodiversity (see 3.3.2.2). This method family has been proposed for assessing social, cultural, and other-regarding (altruistic) values (Cooper & Kagel, 2016), values expressed within instrumental and relational, and sometimes intrinsic justifications (see 3.3.2.2) (see **Box 3.3**).

Strengths and potentials of statement-based valuation

The methods have potential to inform policies in a range of ways; development of policy instruments for conservation, such as the design of payments for ecosystem services schemes (Chan *et al.*, 2017; Engel *et al.*, 2008; Wunder, 2005) including compensation levels to ensure sufficient participation (e.g., Zandersen *et al.*, 2016). A common decision-making context for which the valuation results are used are project appraisals through cost benefit analysis (Atkinson *et al.*, 2018).

Choice experiments or contingent valuation may be suitable when monetary estimates based on representative samples are required in order to design policy instruments for protected areas (e.g., Uyarra *et al.*, 2010), or to gain understanding of the general public's support for or

Box 3.3 Methods for eliciting and articulating broad values and worldviews.

Broad values and worldviews form key aspects of personality (Nilsson, 2014), social attitudes (van Hiel *et al.*, 2007), and group identity (Irzik & Nola, 2009; Mendoza-Denton & Hansen, 2007) (also see Chapter 2) and can therefore be included in the assessment of specific values both using individual based and group-based methods. (e.g., Boyce *et al.*, 2021).

Consensus Analysis consists of analytical techniques and models *'that can be used to estimate cultural beliefs and the degree to which individuals know or report those beliefs'* (Weller, 2007, p. 339). These methods assume *'culture can be defined at least in part as a shared pool of knowledge that is socially distributed according to societal divisions such as class, gender, and the division of labour'* (Swora, 2003, p. 341). The analysis consists of establishing the degree of consensus or dissent among groups that share cultural knowledge around a specific issue, using statistical analysis and qualitative information (Horowitz, 2009; Miller *et al.*, 2004). These methods are used in studies about intra-cultural variation; shared knowledge in traditional societies; fisheries; water and environmental management; climate change perception; local hunting conditions and folk medicine (Carothers *et al.*, 2014; Horowitz, 2009; Hung *et al.*, 2006; Miller *et al.*, 2004; Stone-Jovicich *et al.*, 2011; Swora, 2003; van Holt *et al.*, 2010). See Chapter 2 for discussion of shared values (see 2.4; **Box 2.9**).

Ethical analysis supports systematic reflection upon ethical aspects of a critical public decision. The purpose is to help people understand not only each other's premises but also their own ethical standpoint in a policy setting. According to Feldman (1987), the main contribution of this approach is to devote explicit attention to ethical issues, which are usually neglected in public decision-making whereas they are often implicit to it. In understanding the different stances that stakeholders take and mapping of ethical issues, different tools are used, such as principle based ethics, the ethical matrix, the ethical grid and the ethical participatory assessment (Dubois & Fraser, 2013; Forsberg *et al.*, 2017); which mainly differ in terms of their format, type or extent of deliberation. Principle based ethics looks at the general norms. The ethical matrix examines general principles such as well-being or fairness.

Framing analysis consists of assessing the ways people define what is central, peripheral, meaningful and less meaningful (Davis & Lewicki, 2003). Framing is the process of creating frames and reframing is the change in frames, which might happen as a result of deliberate interventions in conflict mediation (Gray, 2003) or without interventions (Dewulf *et al.*, 2004; Emery *et al.*, 2013). Diverse typologies are used to classify frames (Dewulf *et al.*, 2010; Kaufman *et al.*, 2003; Shmueli *et al.*, 2006; Shmueli, 2008). Generally, methods combine qualitative primary information and qualitative and quantitative analyses of it (Brummans *et al.*, 2008; Dewulf *et al.*, 2004; Lewicki *et al.*, 2003).

opposition to potential policy programmes (Rolfe & Windle, 2013), to evaluate different preferences among stakeholder groups (Monzón-Acuña, 2004), and whether improvements might be financed (Martin-Ortega, 2012; Meginnis *et al.*, 2020). Due to their ability to capture non-use values, these approaches can be used to identify the premium that the public is willing to pay to avoid biodiversity losses (Nobel *et al.*, 2020).

It is claimed that statement-based valuation has advantages over other families in terms of providing procedural and recognition justice of valuations. For example, both individual and group-based methods can be designed to have [statistically or politically] representative samples or target specific groups (e.g., marginalised voices) (Aldred *et al.*, 2017). By including the values of diverse stakeholders in the valuation process these methods can increase the legitimacy of the policy decisions taken based on those values (Kenter *et al.*, 2016a; Pieraccini, 2015).

Statement-based valuation methods can also be used to understand values of less familiar habitats (such as deep oceans), where observation of direct use or societal engagement with the habitat is challenging or does not occur (see 3.3.2.2). Group-based methods (i.e., stakeholder workshops, focus groups, and others) allow for deliberation and social learning processes before values are stated, so that participants can familiarise themselves with different perspectives as well as the targeted nature's contributions to people for valuation.

Statement-based valuation methods provide an opportunity to address, discuss and evaluate the risks and uncertainty of environmental change and associated values. Risk and uncertainty can stem from gaps in knowledge about ecosystem dynamics (including regime shifts and tipping points/thresholds; Lenton *et al.*, 2019), social dynamics and human preferences (Godfray *et al.*, 2018) and technical issues (Morton, 2015) in the valuation process. Methods have very different approaches to assessing how these risks and uncertainty affect value generating and stating processes, making the selection of the method a key consideration (Botelho *et al.*, 2017). In general, research has found that higher outcome uncertainty reduces utility (Lundhede *et al.*, 2015).

Research has also shown that statement-based valuation methods can elicit values related to quality of life, cultural identity, sense of place or social relations in nature and non-use values (Benjamin *et al.*, 2014; Hausmann *et al.*, 2016; Houkamau & Sibley, 2019; Poe *et al.*, 2016; Tinch *et al.*, 2019). Also, the measurement of good quality of life often requires value stating methods (Benjamin *et al.*, 2014). Other advantages of value stating methods include that they can be applied where there is limited or no existing data, and some of these methods are low in costs (e.g., sample sizes are small and low-cost technologies can be used (Scholte *et al.*, 2015)). However, the required skills and budgets differ considerably across methods.

Limitations and disadvantages of statement-based valuation

Most of the statement-based valuation methods are used for ex-ante policy appraisal. Therefore, it is assumed that the stated values of respondent/participant within the setting of the method are transferable to future *real-life* settings. This requires that the participants have a good understanding of the future setting and are willing to convey their real values. Moreover, if participants know or believe that their responses will have a material effect on policy design, and the survey is incentive compatible, then strategic bias (e.g., stating a high value for important issues if there is no actual payment expected) may be avoided. For ex-post evaluation, the value-stating methods assume that participants accurately recall and truthfully report on the values that informed their decisions or behaviour at the time of the environmental (management) change for which values are elicited. Despite the increase in use in academia of valuation based on people's statements, the suitability of the methods for public policy remains disputed (e.g., Carson, 2012; Hausman, 2012; Kling *et al.*, 2012) (see 3.3.2.2).

Social and cultural contexts play a fundamental role in determining what is valued, how it is valued and why (Arnberger & Eder, 2011a, 2011b; Kaplan & Kaplan, 1989; Ode *et al.*, 2009; Swanwick, 2009). Therefore, the outcomes of valuations conducted with statement-based methods are highly dependent on who is included in the valuation exercise and whether the method matches the context to which it is applied (Berkes, 2004; Kelemen & Gómez-Baggethun, 2008).

Power issues that influence or determine which methods are used to elicit and express values and how the valuation process is designed are highly relevant to this method family. Some of the methods are often fully designed and executed by the researcher and lack participation in all valuation steps, whereas others can be more easily co-designed and led by participants. A key characteristic of this method family is that those conducting the valuation collect this value information using purposefully designed data collection methods. In this sense, the role of the researcher (and moderator) requires reflexivity and positionality, where the research reflects on their role in the valuation process and their influence on the outcomes (Soedirgo & Glas, 2020).

With group-based methods, power-relation effects within the group and other dynamics might affect the assessment outcomes (Schaafsma *et al.*, 2018). For example, in deliberative methods, dominance of individual participants can lead to exclusion of other participants and domination

Table 3 5 **Overview of value stating methods.**

See also a more elaborate version including potential strengths and limitations in Annex 3.5.

General Approach (source of data)	How data are collected	Examples of methods
Individual based **Survey-based**	Questionnaires and interviews administered to individuals and/or groups directly (face-to-face), electronically, by mail or by phone	• Contingent valuation • Choice experiments • Ethnographic interviews/ methods • Narrative research • Happiness survey • Life satisfaction approach • Individual-based participatory assessment process • Individual-based Q-methodology • Expert elicitation • Mental mapping
Group-based **Discussions-based**	Facilitator-moderated group interaction	• Public good games • Deliberative valuation (including monetary) • Nominal group technique (NGT); • Focus groups • Scenario assessments/ visioning exercises • Photo-voice • Delphi panels

of one perspective in the results (Dietz *et al.*, 2009). Carefully designed processes are therefore essential to reduce the risk of not representing less vocal participants (Barnaud & Van Paassen, 2013; Felt *et al.*, 2016; Turnhout *et al.*, 2020).

Evidence from reviews about the reliability and validity of these methods is more abundant for some methods than for others. For example, regarding reliability and validity multiple reviews are available of monetary stated preference methods (with mixed results; Haab *et al.*, 2013; Hausman, 2012), willingness to pay (Oerlemans *et al.*, 2016), willingness to accept (Whittington *et al.*, 2017), choice experiments (Rakotonarivo *et al.*, 2016), contingent valuation (Venkatachalam, 2004), and studies regarding the reliability in risk assessment (Hertwig *et al.*, 2019; Pasman & Rogers, 2018, 2020; Rogers *et al.*, 2019). However, the literature search provided limited evidence for other methods, especially those whose application in the context of valuation of biodiversity and nature's contributions to people is more recent. For example, one problem with ranking according to the importance of nature's contributions to people (or ecosystem services) is that participants may rate all types as very important. Such rankings do not help to inform trade-off decisions where not all nature's contributions to people can be provided at the same time and in all policy options (Horne *et al.*, 2005).

The reliability and validity of more structured methods in this family rely heavily on well-created study designs, including the accuracy of the description of the environmental/ biodiversity issue at stake. Errors in the description discovered after the fact can mostly not be changed. Furthermore, large-sample quantitative studies tend to elicit a small range of quantifiable responses. This may limit the adequate elicitation of different value types (e.g. related to spirituality or cultural heritage) and diverse values, especially those that are not (well) quantifiable (Scholte *et al.*, 2015). Statement-based valuations sometimes assume that people have sufficient information about the ecosystem before stating their values; where this is not the case, some scholars argue that it is risky to base environmental management on such values (Ruiz-Frau *et al.*, 2018).

3.2.2.3 Overview of behaviour-based valuation methods

Behaviour-based valuation methods quantify or qualify the value of nature's contributions to people based on observations of people's behaviour using both economic and non-economic indicators. The origin of valuation of nature in economics rests on a behaviour-based methodology. The idea that it is possible to identify the worth of recreational benefits of national parks based on the cost incurred by visitors to travel to the places they visited (attributed to Hotelling (1947), see Pearce, 2002 for an overview of the early developments). Hotelling's suggestions outlined what is called today the travel cost method. At the time, no methods existed to include environmental benefits or costs in evaluations of public policies and the effects were usually ignored and described as intangibles (Pearce, 2002).

More than a decade passed before this insight was further explored in studies by Trice & Wood (1958) and Clawson (1959). Since then, the idea that the value of environmental

benefits can be derived from observing how people purchase linked marketed goods and services is known and referred to as "revealed preference methods". The requirement for use of these methods is that the expenditure in the conventional market is a prerequisite for enjoying the environmental benefits or avoiding being exposed to environmental costs.

Classifying behaviour-based valuation methods

The economic behaviour-based methods are commonly classified into *direct* methods that estimate values based on the observed behaviour of consumers and producers in markets (market price method); and *indirect* methods that estimate values based on a relationship between nature and individuals' behaviour observed through transactions in a linked market or reflected in some measures of costs (Champ *et al.*, 2003; Farber *et al.*, 2006; Freeman III *et al.*, 2014; Hanley & Barbier, 2009a; MEA, 2005; US EPA, 2009).

The main indirect methods include the travel cost method, which can both be based on observation of visits of a single natural site (e.g., national park, historical site) or observation of the choice between different sites (e.g., choosing one site among multiple competing sites of same nature-beaches, urban parks, recreational fishing areas). The hedonic price method is also an indirect valuation method where the housing market (usually, but not exclusively) is used to reveal the value that people place on natural amenities or absence of dis-amenities (Pandit *et al.*, 2014; Taylor, 2008). The methodology can also be used to value the risk of natural disasters (e.g., Tanaka & Zabel, 2018).

Another indirect method relates human health and nature based on the relationship between health status or risk to human health or even mortality and nature. The approach can be used to assess negative values of nature such as health impacts from diseases transmitted through wild species. The negative values are usually monetised through lost earning and cost of treatments (Clabaugh & Ward, 2008; Ruijs *et al.*, 2017). Knowledge of health impacts in the context of protected areas across the developing world is scarce as human health is rarely included in valuation studies (Naidoo *et al.*, 2019). Health valuation has multiple complex interactions and is further elaborated in section 3.2.2.4.

The *cost-based* methods that aims to capture the value of supplying nature's contributions to people include replacement cost, avoided damage cost, defensive expenditure and opportunity cost (Champ *et al.*, 2003; Farber *et al.*, 2006). Replacement cost refers to the cost of replacing nature's benefit or service (e.g., the value of cooling service provided by tree shades on homes by replacing the electricity cost of using air conditioner); avoided damage cost refers to the costs of preventing or avoiding damages in the absence of nature's benefit or service (e.g., sediment retention service of forested land as measured in terms of cost of building retaining walls to hold the sediments); defensive expenditure refers to the costs of taking actions to prevent adverse impacts from declining or deteriorating nature's contribution (e.g., economic benefits of biodiversity gains from management of invasive species); and opportunity cost is the cost of forgone alternative (e.g., deforesting land for building structures has the opportunity cost of forgoing nature's benefits or service from the forested land).

Cost-based methods (replacement cost, avoided damage cost and opportunity cost) have been commonly used to value regulating ecosystem services (Balasubramanian, 2019) and wetland values (Browne *et al.*, 2018), and ecosystem service provided by aquaculture (Custódio *et al.*, 2020) but minimally used to value forest ecosystem services (Acharya *et al.*, 2019). Among the methods used to value wetlands, (Browne *et al.*, 2018) found that out of 50 studies reviewed, replacement cost was used in nine studies, avoided damage in four studies, and avoided cost in two studies. Similarly, opportunity cost has been used most studies that value protected areas in German-speaking Europe (Mayer & Job, 2014), whereas replacement cost has been used in some cases to value ecosystem services provided by aquaculture (Custódio *et al.*, 2020), valuing ecosystem services in the Alps (Grêt-Regamey *et al.*, 2008) and dis-amenity value of incineration and landfilling (Eshet *et al.*, 2005). Avoided damage cost has been used in fewer studies including the one that valued mangrove ecosystem service (Vo *et al.*, 2012). Only one review study was found that considered the production function method to value the ecosystem services provided by aquaculture (Custódio *et al.*, 2020).

Behaviour-based valuations that use non-monetary indicators are emerging, i.e., looking at human action and behaviour to identify the importance of human-nature relationships. Examples include fishing activities (Unnikrishnan & Nagendra, 2015), the examination of documents, i.e. looking at texts, images, or other forms of materials (Scholte *et al.*, 2015), number of photos taken by the public in an advert to indicate aesthetic values (Everard *et al.*, 2010); photo series analysis using social media (Czembrowski *et al.*, 2016), and the number of wildlife pictures posted on a photo-sharing website as a proxy to obtain the recreation and ecotourism values (Willemen *et al.*, 2015). Some of the advantages of these methods include on-the-ground observation (structured, unstructured, participant), consideration of the contexts and details of the valuation objects, and in some cases the free availability and easy accessibility of data (e.g., on social media; Willemen *et al.*, 2015). Limitations include that interpretation and analysis of observations

Table 3 6 **Summary of behaviour-based valuation methods[23].**

Category	Valuation method	Description/main features	Application – Key references
Direct observed behaviour method	**Market methods (Market price)**	The values of ecosystem services or nature's contributions to people directly obtained from what people have paid for the service or good (e.g., timber harvest). Only useful for traded goods and services.	Farber *et al.*, 2006; Aulia *et al.*, 2020
	Livelihood dependence	The livelihood dependence on nature of people. Useful in the context where formal markets have limited roles and people rely on nature for subsistence.	Adams *et al.*, 2020; Daw *et al.*, 2011; Yang *et al.*, 2013
Indirect observed behaviour method	**Travel cost method**	Valuations of site-based amenities revealed by the costs people incur to enjoy them. Based on well-established theory. Commonly used to value ecotourism and recreation values.	Bockstael & McConnell, 2007; Champ *et al.*, 2003; Freeman *et al.*, 2014; Perez-Verdin *et al.*, 2016
	Recreational choice method	Valuation of access to nature areas and changes in the quality of the areas based on observation of the choice between different nature areas. Based on well-established theory. Assumes full information about alternatives.	Hunt, 2005; Lupi *et al.*, 2020; Raguragavan *et al.*, 2013
	Time spent analysis	The value of nature, natural environment or biodiversity partly depends on how much time people spend observing or experiencing such services and how people perceive the value.	Capaldi *et al.*, 2014; Stålhammar & Pedersen, 2017
	Hedonic pricing method – amenity value	The value of a service is revealed from what people will be willing to pay for the service through purchases in related or linked markets, such as housing markets for open-space or other amenity and dis-amenity values. Assumes that people have full information about nature values associated with the purchase.	Bishop *et al.*, 2020; Palmquist, 2008; Rosen, 1974; Taylor, 2008; Gibbons *et al.*, 2014; von Graevenitz, 2018; Eshet *et al.*, 2005
	Hedonic wage method – value of statistical life	The method estimates the risk changes associated with life-threatening events by valuing individuals' willingness-to-pay to avoid risk or estimate the wage premium/compensating wage differentials required to accept riskier jobs. Assumes full information determines choices.	Evans & Taylor, 2020; Viscusi, 1993
	Cost of illness method	The cost of illness links individuals' behaviour and health outcomes including their costs. Relies on dose-response relations.	Clabaugh & Ward, 2008
Cost based methods	**Replacement cost method**	The loss of ecosystem services or nature's contributions to people is evaluated in terms of what would it cost to replace (e.g., tertiary treatment values of wetlands if the cost of replacement is less than the value society places on tertiary treatment).	Heal, 2005
	Avoided damage cost method	The biodiversity and ecosystem services or nature's contributions to people is valued on the basis of costs avoided, or of the extent to which it allows the avoidance of costly averting behaviours, including mitigation (e.g., clean water reduces costly incidents of diarrhoea).	Barbier, 2007; Vo *et al.*, 2012a
	Defensive expenditure method	The incurred expenditures on supply of environmental services are used to infer the implicit value of benefit from consumption of the services.	Freeman *et al.*, 2014; Sinden *et al.*, 2011
	Opportunity cost method	Value of foregone benefits/the next best alternative use of resources (e.g., agricultural use of water and land). The method also calculates the cost of preserving biodiversity.	Batie & Mabbs-Zeno, 1985; Ruijs *et al.*, 2017
Other methods	**Participant observation**	This method directly observes human behaviour (participant observation) that reveals peoples' preferences.	Jerneck & Olsson, 2013
	Document analysis	This method involves analysis of text documents (texts or images) including historical documents that indicates peoples' preferences or the importance they give to nature.	Ostwald *et al.*, 2013
	Photo series analysis method	This method involves analysis of social media-based data (photos) to reveal peoples' preferences. Particularly relevant to cultural ecosystem services.	Keeler *et al.*, 2015; Richards & Friess, 2015; Willemen *et al.*, 2015
	Citizen science method/Participatory action research	A tool to understand citizen's understanding. Communities and individuals are involved in designing a research question and perform scientific experiments with minimum involvement of professional scientists.	Kaartinen *et al.*, 2013; Schröter *et al.*, 2017

are difficult (Jerneck & Olsson, 2013), data availability is limited, and reliability and validity issues for documents exist (Ostwald *et al.*, 2013; Piwowarczyk *et al.*, 2013). These relatively new non-monetary valuation methods nonetheless have the potential to impact valuation practice in coming decades.

A brief description of the behaviour-based methods and their main features and limitations are summarised in **Table 3.6** (more details provided in Annex 3.6). Good practice guidelines are presented in Annex 3.7.

23. Systematic review on method families (https://doi.org/10.5281/zenodo.4404436). See behaviour-based valuation.

Challenges and potentials of behaviour-based methods

The main limitation of behaviour-based valuation is that the methods require explicit assumptions about the relationships between behaviour, characteristics of nature and its contribution to well-being. This needs a well-established conceptual and empirical understanding of the relationships which are often not available. It is often assumed that people act based on full information about nature. A global assessment of disease burden from environmental risks found that the cost-of-illness method to assess prevalence of disease is poorly used in practice (Prüss-Üstün *et al.*, 2016).

The presumption of all cost-based methods that cost is a good measure of societal value is not accurate and adequate (Heal, 2005). For example, for replacement cost to be an adequate measure of economic value of the nature's contributions to people, the replaced object or system has to be a least-cost alternative and like-for-like in quality and quantity (equivalent) to the nature's contributions to people in question (Freeman III *et al.*, 2014).

The main advantage of the behaviour-based valuation methods is that they avoid hypothetical bias (see statement-based methods, section 3.2.2.2). Combining statement-based and behaviour-based valuation has been an active area of research (Adamowicz *et al.*, 1994; Cameron, 1992). For example, the travel cost method has been used in conjunction with discrete choice experiments (Czajkowski *et al.*, 2019; Ferrini *et al.*, 2008) and been expanded to understand temporal stability of recreational values (e.g., recreational value of Corong in Australia over a seven-year period (Rolfe & Dyack, 2019)). The potential to improve valuations by combining nature-based methods with behaviour-based methods appear to be a promising area of valuation research. Examples include better specification of hedonic models using spatial biophysical resource mapping, combining degree of naturalness of sites in travel cost methods. Behaviour-based valuation has the potential to contribute to natural capital accounting (**Box 3.7**, section 3.3.4.1) as it captures observed interactions between ecosystems and economic activities which are amenable to accounting principles. Developing standards to align outputs from behaviour-based valuation to accounting standards is also a potential of the methods to inform decision-making going forward **(Box 3.7)** (see 4.6.4.2). Improved access to environmental, social and economic databases across global regions could reduce the barriers for the application of these valuation methods.

3.2.2.4 Overview of integrated valuation methods

Integration involves a process or framework that synthesises different types of information with the overall purpose to generate a more comprehensive understanding of values at stake in a given policy context. While nature-based, behaviour-based, and statement-based valuation can be integrative, some methods are specifically designed to integrate inputs from different methods, or different types of values, often elicited using principles from different method families. As inclusion of diverse forms of values and knowledge for decision-making is a key challenge in valuation, methods used to integrate values are reviewed in this section. Integration can refer to following: diverse and sometimes incommensurable value dimensions (i.e., value pluralism, types of values; Dendoncker *et al.*, 2018), different worldviews (i.e., knowledge systems; Jacobs *et al.*, 2016), the inclusion of the interest of different stakeholders groups, the application and integration of multiple valuation methods and tools, over aspects of the nature-human system (biophysical – economic – well-being) and aggregations of results over spatial and temporal scales (Jacobs *et al.*, 2016). Integration often takes place implicitly (in a decision informed by various types of information) or through a designed process, which might not be fully explained or described. However, some integrative methods used to bring together different types of information and values to support decision-making are well-known and the procedures described and formalised (Jacobs *et al.*, 2018; Pascual *et al.*, 2017a).

Some valuation methods are inherently integrative and therefore do not fit well within the nature-based, behaviour-based, and statement-based methods. These provide formalised ways of bringing together different forms of value and are therefore potentially useful methods for accounting for diverse values of nature.

Integrated valuation methods therefore sit on the edge of "valuation methods" and "decision-making tools", but still have inherent valuation features which determine which and how values are transferred to decisions (Gómez-Baggethun *et al.*, 2014; Jacobs *et al.*, 2016; Pascual *et al.*, 2017). A specific purpose of integration is to support decision-making processes to bring together diverse values and diverse stakeholders and support decision-making between alternative courses of action. Decision-making at a higher social scale than the individual requires consideration of how to define this higher scale, i.e., *society* or the community the valuation is relevant for. Furthermore, the principles that determine how to adjudicate between different possibilities also need to be decided. To help draw out the methodological distinctions and suitability of the individual integration methodologies, we distinguish between methods which are *integrative* in terms of the value information they bring together (Participatory Mapping, Production functions, Integrated Modelling), and methods that are *explicitly designed to inform decisions* directly, i.e., "decision-making tools" (cost-benefit analysis, multi-criteria decision analysis, participatory rural appraisal, deliberative decision making). These categories are indeed overlapping, but the

Table 3 7 **Overview of integrated valuation methods, including integrative methods and decision support tools.**

Detailed references on strengths and limitations can be found in Annex 3.8.

Type	Integrated valuation methods	Description/main features
Integrative methods	**Participatory mapping**	Spatial identification of NCP according to stakeholder knowledge (Brown & Fagerholm, 2015)
	Production function approaches	Indirect valuation method where nature is valued as an input into the production of a good or reduction in damages (e.g. Barbier, 2000, 2016; Custódio *et al.*, 2020). The production function approach is essentially an example of a combination of nature-based and behaviour-based valuation.
	Integrated modelling	Linking different models for a given purpose, without necessarily considering the sharing and reuse of the contained models (Granell *et al.*, 2013). Fundamentally, the purpose of model integration is to expand the complexity of the representation of a system (Haacker *et al.*, 2019). Consequently, an integrated model can be defined as a system consisting of sequentially connected models of natural and/or social systems (Haacker *et al.*, 2019).
Decision support tools	**Cost-benefit analysis CBA**	CBA is an economic framework to account for environmental impacts where the benefits and costs of different alternatives are measured and aggregated in monetary terms and compared to assess the alternatives (Atkinson & Mourato, 2008; Dong *et al.*, 2016). The aim is to account for positive and negative consequences of alternatives by converting them into monetary flow. The analysis includes identification of relevant impacts over the lifetime of alternatives in monetary units, calculation of net present values by discounting the results to base year, conduct of sensitivity analysis, and recommendation of the best alternative, sensitivity analysis and often distributional effects, and selection of the alternative which maximizes social welfare (Boardman *et al.*, 2018; Choy, 2018; Saarikoski *et al.*, 2016; Choy, 2018; Cimon-Morin *et al.*, 2013; Duke *et al.*, 2013). In particular, cost-benefit analysis formalizes the procedure of how to convert benefits and costs of different impacts that occur at different points in time.
	Multi-criteria decision analysis MCDA	MCDA (or multi criteria decision-making MCDM) is a general framework for supporting complex decision-making situations with multiple and often conflicting objectives that stakeholder groups and/or decision-makers value differently (Belton & Stewart, 2002). MCDA is also a set of methods to perform sustainability evaluations as a result of its flexibility and the possibility of facilitating dialogue between stakeholders, analysts, and scientists (Cinelli *et al.*, 2014). In all of these, the basic idea is to evaluate alternatives with the multiple criteria that capture the key decision-making contexts. Stakeholders and decision-makers outline a set of criteria by which to compare alternatives, score the performance of each alternative against each criterion, and weigh the criteria based on their relative importance (Cegan *et al.*, 2017). MCDA techniques can be used to identify either the single most preferred alternative, to short-list alternatives for subsequent analysis, to rank alternatives or to distinguish acceptable from unacceptable possibilities (Achillas *et al.*, 2013).
	Participatory rural appraisal PRA	Participatory or rapid rural appraisal with the help of local people uses various tools like maps, seasonal calendars, matrices, rankings, grouping, scoring, transect walks, analysis of trends and changes, institutional diagrams, and analytical diagrams. Participatory or rapid rural appraisal has been widely used in natural resources management (for soil and water conservation, forestry, fisheries, wildlife, community planning, etc.), programs for women and the poor, agriculture, health and food security (Chambers, 1994).
	Deliberative decision-making processes	In deliberation, participants undergo a prolonged period of discussion and reflection on their own values and viewpoints and those of other participants. Some deliberative methods aim to identify group-level consensus opinions for decision support, providing an alternative to the simple aggregation of individual preferences (Murphy *et al.*, 2017; Palomo *et al.*, 2011a). Including a deliberative element in the valuation activities can lead to more informed (Lienhoop & MacMillan, 2007) and better decision-making (Kenter *et al.*, 2016). This information provision and preference formation objective underlies many of the deliberative monetary valuation studies (e.g. Alvarez-Farizo & Hanley, 2006; Philip & MacMillan, 2005).

distinction is important in interpreting the main strengths and limitations[24] **(Table 3.7)**.

Challenges and potential of integrated valuation

In summary, the benefits of applying integrated valuation of nature, identified from the above reviews, can be categorised into its ability to: i) include multiple value dimensions and worldviews, ii) to take account various stakeholders interests into valuation process, iii) to provide comprehensive scientific information to decision–making domains based on information derived from multiple methods and values, and iv) to deal with issues of social equity, fairness, and representativeness in effective ways.

A great deal of challenges comes together with the promises of integrated valuation. One way to look at the challenges of integration is how to make the benefits of integrated valuation to be realised in practice. This includes for instance, how to identify and integrate/aggregate multiple value dimensions in context; how to make sure various stakeholders groups participate in the process

24. Systematic review on method families (https://doi.org/10.5281/zenodo.4404436). See integrated valuation.

to deal with various forms of equity and fairness; how to design and implement multidisciplinary research to obtain comprehensive and scientifically credible outcomes; and how to effectively deliver research outcomes to decision-makers.

To enhance the inclusion of multiple and diverse values, new ways of combining value stating methods with methods from other families are explored. Each integrative process, however, has limitations, ranging from technical challenges to how well they can deal with uncertainty, power dynamics, representativeness, or ease of communication of the outputs. Moreover, several integration methods require highly skilled facilitators, and the results can be difficult to communicate clearly to decision-makers. Given the importance of value integration methods for complex valuation contexts, efforts are needed to develop integration approaches that strike a balance between comprehensiveness, on the one hand, and ease of application, on the other. The review shows that integrated valuation methods have been developed to elicit a wide range of value types but it remains unclear whether these have been successfully used for decision-making. Health valuation provides an example of a field where experts are developing integrative frameworks to understand linkages between biodiversity and human health and well-being (see Annex 3.9). Integrated valuation initiatives are also developing to support decisions in the business sector, as businesses realise their dependence and impact on Nature (see **Box 3.4**).

Box 3 4 Methods for valuation of nature for businesses.

Businesses have impacts on nature (e.g., pollution, habitat destruction, overexploitation) and are dependent on nature (e.g., water use, pollination, flood protection). These impacts and dependencies are not visualised on a company's profit and loss statement or on their balance sheet. They remain "externalities", or issues without internal consequence. The lack of standardisation across corporate environmental assessment methods, including natural capital accounting standards and practices, has always been an obstacle for mainstreaming of environmentally sustainable activities and assets across the economy as well as correct corporate identification of and management of environmental risks. Fortunately, the situation is rapidly changing. Businesses that understand the true value of nature can benefit from improved risk management, new business opportunities, improved communication with investors, enhanced stakeholder engagement and anticipation of future legislation. Therefore, businesses are increasingly looking for ways to measure and value their impacts and dependencies on ecosystems.

There are several frameworks and methods for valuing nature in a business context. The Natural Capital Protocol (Natural Capital Coalition, 2016) has been instrumental in advancing the way of thinking. It is a standardised framework to identify, measure, and value direct and indirect business impacts (positive and negative) and/or dependencies on natural capital. The Protocol aims to support better decisions by including how we interact with nature, or more specifically natural capital, in decision-making and provides guidance on all types of valuation, whether qualitative, quantitative, or monetary. The Protocol describes the main valuation techniques and helps businesses to select the most appropriate one(s) for their assessment. This framework approach is now being translated into more specific and prescriptive standards on measuring and valuing natural capital, such as the European Union funded Transparent and Align projects. The project is led by the (Value Balancing Alliance, 2021), an alliance of multinational companies coming together with a common goal: to create a way of measuring and comparing the value of contributions made by businesses to society, the economy, and the environment – by means of a uniform, internationally recognized valuation method for calculating reliable sustainability metrics, metrics which previously are not reflected in a company's balance sheet. The Alliance translates environmental and social impacts into comparable financial data. Traditional environmental and social reporting stops at the quantification of impacts (e.g., tonnes of greenhouse gas emissions). The assignment of a monetary value to these impacts allows for an understanding of the scale of the consequences of more traditional measurement and reporting.

A promising development is the establishment of a business focused subgroup under the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA), which will continue the work of the workstream on business accounting (SEEA Business accounting, United Nations, 2019) under the "Natural Capital Accounting and Valuation of Ecosystem Services" (NCAVES) funded by the European Union. This workstream aims to improve the dialogue between national statistics offices, businesses and the System of Environmental Economic Accounting (SEEA EA, United Nations, 2021a). Both the overall concept of ecosystem accounting, as applied by the System of Environmental Economic Accounting (United Nations, 2019) and specific elements of it might be instructive for businesses that are interested in applying natural capital accounting (Lammerant, 2019, 2021a, 2021b).

Companies that already apply tools for measuring biodiversity at site level and with a regular periodicity can easily integrate this data into extent and condition accounts. Adding monetary ecosystem services accounts will increase insights into the links between ecosystem condition and ecosystem services value. This will improve the business case for investments in ecosystem restoration.

In terms of natural capital data, a business consultation in 2019 confirmed that data collection is an expensive activity for companies. It's often hard for sustainability professionals within the industry to justify return of investment. Therefore,

data sharing and open-source databases are very important for companies. Companies that start exploring the System of Environmental Economic Accounting will discover that governments have plenty of natural capital information, often at subnational level (e.g., watershed level, specific protected areas) which can help companies put their ecosystem performance in the right context. If national statistics offices invest in making these natural capital data more accessible to businesses and tailoring them to the business needs, this would be a major step towards strengthening corporate natural capital accounting and improving internal decision-making and external disclosure.

Finally, there are many initiatives in the field of external disclosure. One of them is the Task Force on Nature Related Financial Disclosures (TNFD, 2021). The goal of this initiative is to provide a framework for organisations to report and act on evolving nature-related risks, in order to support a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes. The Task Force is developing guidance on how to measure and value nature-related risks and opportunities. A key development is the transformation of the European Union Non-Financial Reporting Directive into the European Union Corporate Sustainability Reporting Directive (CSRD) (European Commission, 2021) which will become operational in 2023 and introduces more detailed reporting requirements. Also, during CoP26 in Glasgow, the International Financial Reporting Standards Foundation has announced the creation of its new International Sustainability Standards Board (ISSB) that will develop a comprehensive global baseline of high-quality sustainability disclosure standards to meet investors' information needs. All these developments are expected to generate a tremendous shift in the business and financial community mindset in terms of valuation of natural capital, a shift from shareholder to stakeholder capitalism (Bakker, 2020; WBCSD, 2021).

3.2.3 Valuation and diverse value types

The IPBES value dimensions (IPBES, 2018) (see Chapter 2) occur in all method families, with a dominance of instrumental values throughout, and relational values being the least represented. Nature-based valuations are more often considering intrinsic values than any of the other three method families **(Figure 3.19 right)**. This illustrates that valuation experts take a different perspective on what value types the method they are using can assess. Nature-based valuation assesses intrinsic values of nature by assessing e.g., how biodiversity underpin ecosystem functioning, irrespective of the importance to people. In contrast, statement-based valuation assesses intrinsic values by assessing why people consider nature to be intrinsically

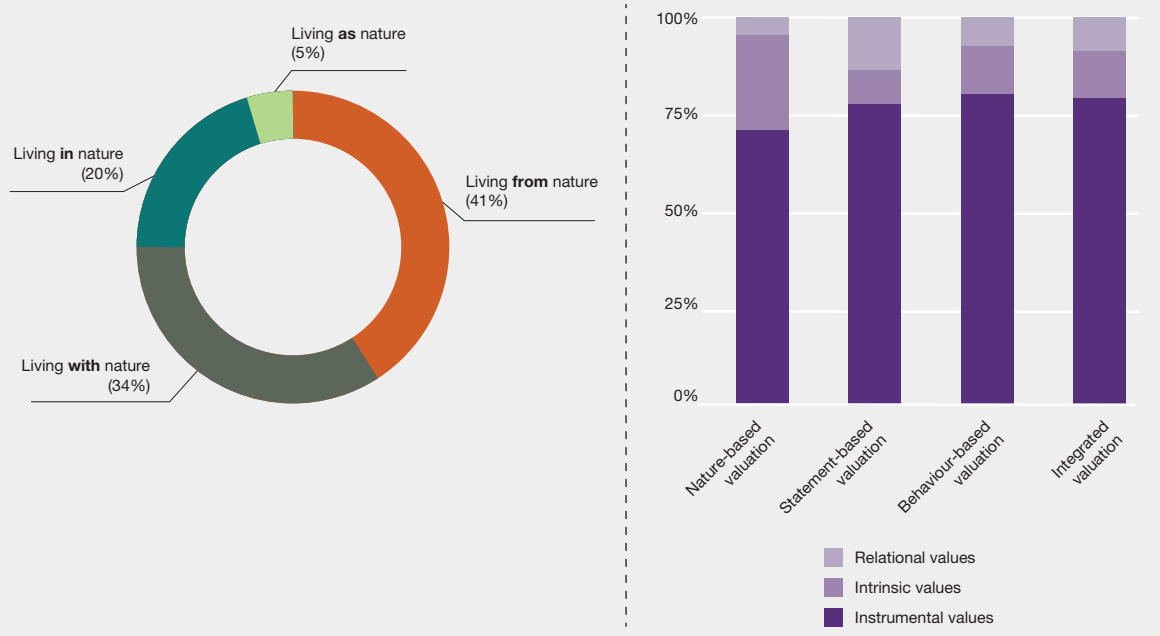


Figure 3 19 **Value justifications or dimensions (IPBES 2018c) relative per method family and mentioning's of broad values related to the four life value frames.**

On the left, percentage abundance of valuations, on the right, distribution per method family (systematic in-depth review n=1163). Note that justifications as well as aspects of life value frames often co-occur in valuations (systematic indepth review n=1163).

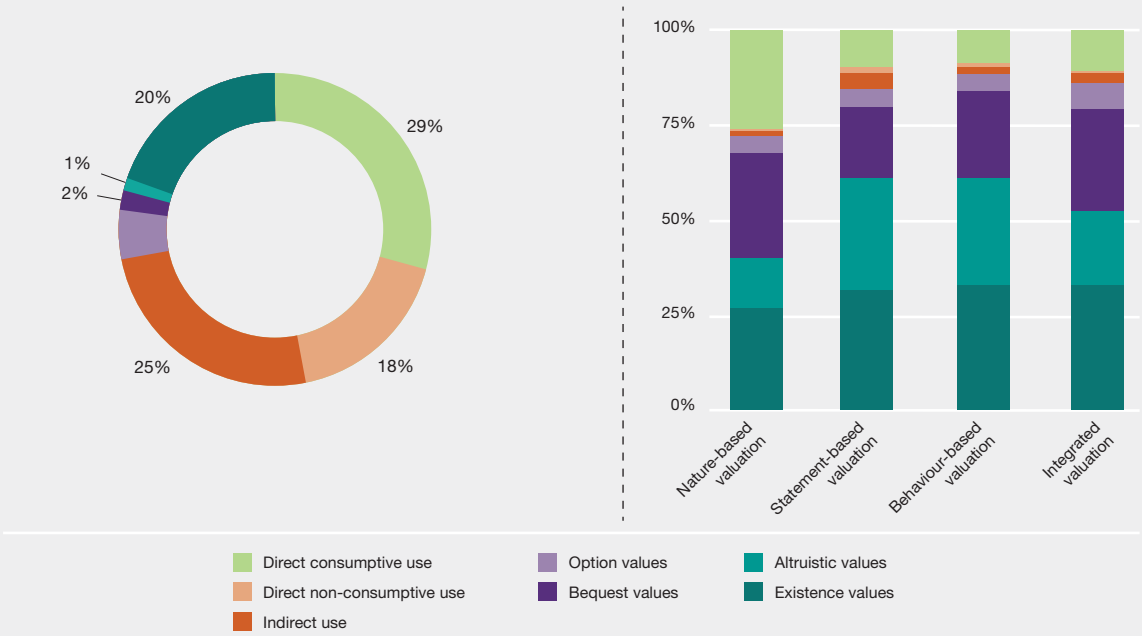


Figure 3 20 **Value types sensu "total economic value" framework in valuations.**

On the left, percentage abundance of valuations, on the right, distribution per method family (systematic in-depth review n=1163).

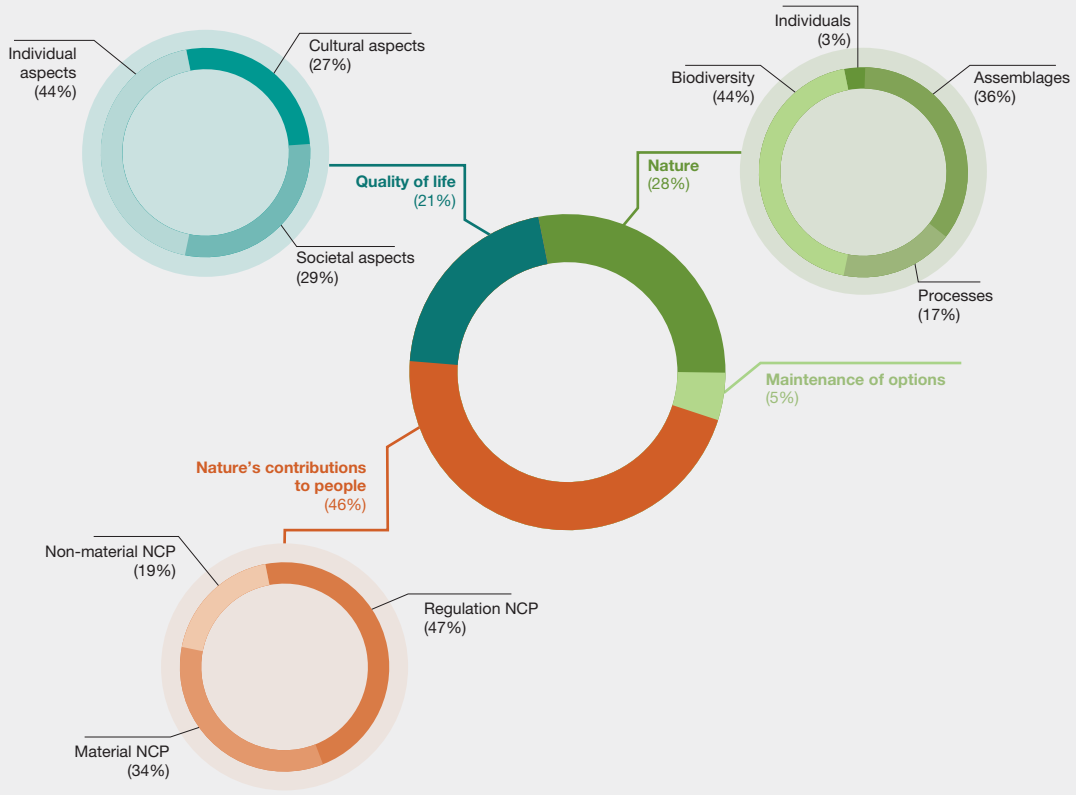


Figure 3 21 **Percentual abundance of various valuation targets (systematic in-depth review n=1163).**

Figure 3 22 **Abundance of various value indicators over all valuations (upper left), relative per method family (upper right) and per discipline (lower panel) (systematic in-depth review n=1163).**

valuable. So while both methodologies provide important information on intrinsic values, they provide very different information for decision-making. Despite the potential lack of consistency in terminology used across the valuation field as a whole, the review provides clear evidence that the assessment of instrumental values has been the main focus in the literature. The *Living from, with, in* and *as nature* value frames are prevailing in all four method families. *Living as nature* is the least abundant, while *living with* and *from nature* are roughly equally represented **(Figure 3.19 left)**.

Valuations have considered the full range of *specific value types sensu* total economic value classification. While *use values* (including indirect use) are the dominant target of valuations, *existence values* are targeted in 20% of the valuations, and more often by nature-based valuations. *Option, bequest* and *altruistic values* occur less often (7% in total) but still prevail throughout the four method families **(Figure 3.20)**.

Regarding IPBES *value targets*, valuations have also considered the full range **(Figure 3.21, Figure 3.15)**. Just under half of the valuations target *nature's contributions to people*, while *nature itself* and *good quality of life* are targeted in roughly a quarter of valuations each **(Figure 3.21)**. Distribution among subcategories of IPBES value targets (IPBES, 2018) further demonstrates the diversity of valuations **(Figure 3.21)**.

Valuations have applied a broad range of *value indicators* to articulate the diverse values of nature. The most commonly used indicators are biophysical, due to the dominance of biophysical valuations. While the use of certain indicators is skewed to a certain method family or discipline (e.g., nature-based methods more often use biophysical indicators, economic methods more often use monetary indicators), this is by far not a discrete and exclusive relationship. Monetary, Biophysical and Socio-cultural indicators are found in valuation studies from every method family and disciplinary group **(Figure 3.22)**.

Table 3 8 **Valuation methods can be classified into four method families with distinct characteristics.**

	Valuation method families			
	Nature-based methods	Statement-based methods	Behaviour-based methods	Integration methods
				
What is assessed?	Nature, physical or ecological components of nature	What people express when asked about the importance of nature	What people do in nature, for nature, with nature, to, as nature	Different outputs from one or more methods, to support decision-making
How is information about values generated?	Measuring nature and its functions through several methods such as remote sensing, field observations, consulting experts, etc.	Asking people (interviews, questionnaires), analysing other expressions (e.g., narratives, discussions, art, etc.)	Observing people, assessing records of people's behaviour (e.g., park visits, policy choices, (non-)market exchanges, etc.)	Synthesising, comparing, contrasting, deliberating, consolidating or aggregating diverse values for decision-making or decision support
Which values are elicited	Mainly intrinsic and instrumental values	Instrumental, intrinsic and relational values	Mostly instrumental values	Instrumental, intrinsic and relational values
Examples of value indicators	Species richness, CO_2 stored, ecological indicators	Preferences for nature's contributions to people, subjective well-being indicators, narratives of human-nature relationships, required compensations	Time spent, share of household income, prevalence of disease, price of land, use of plants	Strength of support or objections to policy options, welfare gains or losses from projects
Examples of methods and approaches	Biodiversity assessment, ecosystem services mapping, Delphi method	Group discussion, Q-methodology, choice experiments, valuation interviews	Participant observation, travel cost method, cost-based method, livelihood dependence, photo-series analysis	Natural capital accounting cost-benefit analysis multi-criteria decision aid, integrated modelling, deliberative decision methods
Type of stakeholder inclusion	Most methods do not include stakeholders, though some inclusive approaches exist (e.g., based on local ecological knowledge)	Most methods include stakeholders to some extent (e.g., surveys) and inclusion is often integral to the method (e.g., participative approaches)	Most methods have limited stakeholder inclusion (e.g., analysis of market accounts) but some include diverse stakeholders	Some methods can be non-inclusive (e.g., desktop multicriteria decision analysis MCDA) but often, inclusion is key to the decision support aspect (e.g., participatory scenario building)
Examples of typical valuation "products"	Biodiversity indices, maps of priority areas for policy/management action, improved understanding of the importance of components of nature	Ranked importance of components of nature or nature's contributions to people, (monetary) value of protection of biodiversity-rich areas, explanations for why people value nature	Ranked importance of components of nature or nature's contributions to people, quantified changes in values nature or nature's contributions to people, explanations for why people value nature	Ranked policy options, evaluation of socio-economic and environmental impacts of policy options, improved understanding of conflicts/ shared values of nature
Limitations/ concerns	Impact on people assumed but not assessed, dependence of nature is not assessed by the people dependent on the resources	Concern about reliability of statements, power disparity can reduce the validity of group-based methods, representativeness in selection of respondents	Requires conceptual and empirical understanding of the relationships between behaviour, nature and its contribution to well-being, challenging to reveal in-depth understanding of motivations behind behaviour	Aggregation of values across groups of people can reduce representation of values, combining multiple value types creates incommensurability concerns

Valuation methods and approaches: diverse as a whole, but specific in their application

While the reach of valuation methods and approaches in their totality is clear from the above, it is important to note that individual valuation methods are often highly specific. Most valuations apply a single main method, but quite often methods are combined and auxiliary methods are used to complement the valuation. A biophysical valuation can for instance be complemented with a benefit transfer to articulate value in monetary units, or a statement-based method applies outputs from a biophysical mapping to reveal preferences. While these are not necessarily full method combinations, they still broaden the range of values included and indicators used in valuations.

In summary, there are many methods and approaches available to achieve valuation of nature and its contributions to people, and to articulate these values to the decision-making process. Nature-based, statement-based, behaviour-based and integrated methods each have their own features, strengths and limitations for application (see **Table 3.8**).

The diversity of methods and approaches, and the specific limitations and strengths, call for combining different complementary methods. Limitations can as such be alleviated and strengths combined, and a more diverse set of values can be elicited and articulated. In practice, consulting valuators from different disciplinary backgrounds can help select the appropriate method(s). Mixed-method approaches however can be more demanding regarding skills, resources and time. The investment in the valuation process depends on the complexity and stakes of the valuation context: high stakes and high complexity justify investing in a more complex and demanding valuation (see Chapter 1).

Several limitations and concerns do not stem from one specific method, approach or method family, but apply to valuation as a whole. Section 3 will deepen the assessment of some of these main issues and concerns and offer guidance to improve the practice of valuation.

3.2.4 Valuation practice in IPLC contexts

The fields of ethnography, anthropology, conservation sciences and development studies have generated a rich knowledgebase for understanding the nature-specific values of IPLCs, how these values are manifested (i.e., the "valuing" process), and in some cases their value systems and worldviews. This body of literature imparts very little knowledge and understanding, however, about IPLC valuation. For example, how those values are elicited and assessed in order to generate meaningful insights into the phenomena of valuing for different purposes (see 3.1 for definition of valuation).

Past reviews and assessment of valuation methods (Annex 3.1) do not discuss or describe how valuation methods have been applied within indigenous peoples and local communities (IPLC); nor do they compile and synthesise valuation methods that are used by IPLC. The terms 'indigenous' and 'Indigenous and Local Knowledge (ILK)' are absent from the economics of ecosystems and biodiversity's 2010 synthesis report, for example, and mentioned only twice in the 2018 report. A review of published IPBES assessments including a total of nine ILK Dialogues (three of which were conducted for the values assessment) that took place across these assessments between 2015 and 2021 as well as the recently released Local Biodiversity Outlook 2 (Forest Peoples Programme, 2020), a complement to the fifth Global Biodiversity Outlook (Secretariat of the Convention on Biological Diversity, 2020) emphasises the critical contribution that IPLC worldwide make to the achievement of the Aichi Targets. However, none of them discusses or reviews any valuation methods and approaches, including IPLC valuation.

Historically, the study of IPLC processes through western science lenses has led to gross misrepresentations of IPLC, their traditions as well as their knowledge systems (Battiste & Henderson, 2000; Smith, 2003; Smith, 2012). Valuation studies undertaken in IPLC contexts and conducted by researchers who use western science approaches to interpret people's expressions, behaviours and decisions, often falls short in their ability to adequately capture IPLC's holistic and multi-layered understanding of and relations with nature **(Box 3.5)**.

In this section, we demonstrate the value and limitations of integrating knowledge systems and particularly ILK and western science approaches. We first apply the methods families classification system to describe and understand IPLC valuation from a western science perspective. Doing so facilitates the detection of numerous coincidences and similarities between IPLC and non-IPLC valuation processes; the existence of shared characteristics and processes for valuation between knowledge systems points to the potential that exists for dialogue, knowledge sharing and knowledge integration. Indeed, indications of integration already exist in the few examples we were able to find of intercultural valuation methods (i.e., methods that draw from both western science and ILK) **(Box 3.5)**.

Understanding IPLC valuation using a western science perspective can make explicit the limitations of rigid application of the "methods families" approach, beyond western-science informed approaches, particularly in terms of their inability to adequately describe the full diversity of

Box 3 5 **Understanding "evidence" from IPLC epistemologies.**

Respecting IPLC valuation requires comprehension of indigenous worldview that elicits a holistic view of nature in which humans are part of it and not detached from it, and which is vital to understand how evidence is conceptualised, acquired and shared within IPLC contexts (LaDuke, 1999; McGregor, 2004). In western disciplines, ILK is validated into an academic discipline through a validation process or co-production of knowledge wherein participants from diverse knowledge systems concur to research processes. Still, research questions and methodologies are defined outside indigenous worldviews (Smith, 1999). Other approaches centre on validity being assumed independently within each knowledge system creation and acceptance of findings are decided within different institutional settings (Smith, 1999; Tengö *et al.*, 2014).

Indigenous researchers who mostly write from their *living* realities, are constantly under pressure to *validate* or provide *evidence* of knowledge production within a western academic standard. This is because there is a lack of understanding of indigenous ways of knowing (epistemology), ways of being (ontology) and ways of doing research (axiology). However, "relationality" is a vital component of an indigenous worldview, highlighting the holistic view that human and non-human entities are interconnected to the streams of life, and therefore a relationality balance is required to maintain an equilibrium between all entities (Huambachano, 2018). For example, storytelling is a method of gathering, preserving, and interpreting the oral accounts and voices (knowledge) of the ancestors within a specific geographic area, and passed down from one generation to the other. Therefore, the *knowledge* emerging from storytelling is valid and reliable because storytelling is created and shared through relationships and stands as valid, and reliable only in the relationship (Wilson, 2008).

Relationality is what distinguishes indigenous storytelling from qualitative research methodologies that use storytelling as a method for capturing single life stories (Batty, 2009; Portelli, 1997). Storytelling is not captured in journal papers but in videos, reports, web pages, and similar material produced mainly by IPLC and their organisations. Indigenous researchers continue to struggle with questions regarding the *validity* of their knowledge production, for example, when they are asked about the difference between talking circles and focus groups. The answer lies in the nuances of their worldviews that are, for instance, placed-based and ritualistic. Therefore, talking circles are different to focus groups because talking circles distinguish the rituals and protocols underpinning indigenous' ceremonial performance (Huambachano, 2018).

It is important to find ways to adequately consider indigenous peoples' worldviews, agency, systems of knowledge systems, and evidence (McGregor, 2004; Smith, 1999). Indigenous scholars are heralding novel research models to reclaim indigenous voices within research that support their well-being and sovereignty aspirations (Estrada, 2005; Huambachano, 2018; Pihama *et al.*, 2002; Wilson, 2008).

valuation practice that is undertaken by IPLC. On the one hand, it is an indication of the need to assess the logic of the Methods Families classification (e.g., what type of information is considered relevant for valuation?) and reflect on how families could be restructured or expanded so that they are more inclusive of other worldviews (e.g., could statement-based valuation include expressions by non-human species and ancestor?). On the other hand, it highlights the larger issue of limitations of knowledge integration: not all knowledge is compatible and thus feasible to integrate, in some cases integration can only be partial, and that there is great value in allowing multiple parallel approaches to co-exist without the need for integration or cross-validation between knowledge systems (Chilisa, 2020; Johnson *et al.*, 2016; L. T. Smith, 2012). In this vein, the same set of data was assessed through an IPLC lens, applying one of many indigenous science approaches. The results are an opportunity to understand IPLC valuation without the requirement of fitting it into a classification system that was not developed with IPLC approaches in mind.

3.2.4.1 From valuing Indigenous and Local Knowledge (ILK) to valuation by Indigenous Peoples and Local Communities (IPLC): A historical context

IPLCs as providers of local knowledge for valuation: Valuation in IPLC contexts

Indigenous people and local communities have contributed important sources of data, knowledge and information for valuation studies conducted by outsiders often without their knowledge or consent. Their contributions to nature-based valuation have been recognized and is increasingly critiqued, particularly their unconsented role in assisting researchers to understand and monitor species population, population dynamics, long-term life cycles of plants or animals, and the rich biodiversity inhabiting their territories (Antunes *et al.*, 2018; Berkes, 2008).

Indigenous and local knowledge continues to enrich scientific and other pursuits today. Brook & McLachlan (2008) examined 40,900 articles published in 360 journals and assessed 12 prominent ecological and conservation

journals to characterise how local and ecological knowledge has been used in the ecological and conservation literature over the last 25 years (1983 – 2008). Their work is highly informative of the incorporation of ILK into conservation sciences (e.g., interview methods were the most common methods used to solicit ILK). Despite a growing use of ILK and specifically Local Ecological Knowledge (LEK) in conservation research, they reported that studies "generally failed to actively include community members in the research process" (Brook & McLachlan, 2008, p. 3501). Indeed, although indigenous empirical knowledge of nature is highly regarded by external researchers, spiritual dimensions of knowledge production or interactions with the unseen world as a source of knowledge production are usually disqualified in disciplinary discourses (Gaudry, 2011; McGregor, 2004; Simpson, 2011; Wilson, 1995). It has often been the case that information and observations obtained from IPLC that do not fit classic academic standards of "reliable" data have been omitted or misinterpreted by the non-indigenous scientific community (Agrawal, 2002; Johnson *et al.*, 2016; Turner *et al.*, 2008). ILK and indigenous science and worldviews are generally underrepresented knowledge generation institutions and are often subjected to validation procedures developed by western informed epistemologies (Johnson *et al.*, 2016; Louis, 2007; Tuck & Yang, 2012). In the policy context, policymakers have often dismissed community information when not aligned with their objectives (Agrawal, 2002; IPBES, 2019c).

IPLCs as the subject of valuation studies by outsiders

Indigenous and local people are often the subject of ethnographic and anthropological studies undertaken to describe, characterise and explore their broad and specific values, their cosmovision and worldviews, and their socio-political and economic contexts. The study of the importance of nature to IPLC worldwide is perhaps the most studied dimension of the interlinks and dependencies between IPLC and their natural environment and it is the subject of tens of thousands of publications on rural livelihoods.

In the mid-1950s and early 1960 the application of economic and non-economic valuation in IPLC territories emerged from an anthropological perspective. The initial objective of this perspective was to "understand local lore" with the purpose of documenting and evaluating what IPLC value about nature, and the practices and approaches they have developed to conserve biodiversity (see Conklin, 1957; Frake, 1962; Goodenough, 1957). Applying the principles of cognitive/linguistic and ethnoscience systematised data collection and analysis, indigenous and local knowledge and technologies were vigorously documented particularly in the 1970s and 1980s (Atran, 1985; Berlin, 2014; Berlin *et al.*, 1974; Ellen, 1993; Ford, 1994; Hunn, 1977, 1982; Posey, 1985). This paved the way in academia and development arenas for the inclusion of local perspectives in setting priorities for sustainable development (Rhoades & Bebbington, 1995; Rhoades & Booth, 1982; Warren *et al.*, 1989). As a result, IPLC practices have been widely promoted and ILK has become *'information currency in the international agricultural research centers and the World Bank'* (Nazarea, 2006).

The recognition of indigenous peoples as legitimate right holders primarily determined their participation in the valuation of nature and active inclusion of their principles or life values. Human rights and international environmental instruments, such as the International Labour Organization Convention 169 in 1989, the CBD in 1992, the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) in 2020, cemented the path for indigenous recognition. These instruments provided legal tools such as the duty to consult and seek free, prior and informed consent with the potential to empower indigenous participation in environmental assessment and decision-making scenarios worldwide (Cariño & Colchester, 2010; Orduz Salinas, 2014). Moreover, the creation of the United Nations Permanent Forum on Indigenous Issues (UNPFII) established a legitimate space for voicing indigenous peoples' concerns against development projects and other multifaceted threats to their ways of life, internationally acknowledged as compatible with sustainable use and conservation of biodiversity (Stankovitch, 2008). Institutional policies and guidelines of international financial agencies about the observation of the United Nations Permanent Forum on Indigenous Issues (UNPFII) peoples' rights confirmed the trend towards recognizing indigenous peoples (Corntassel, 2003; Davis, 1993; World Bank, 2016). Additionally, changes in the global legal framework have boosted indigenous peoples' international, national, and local initiatives for inclusion of sensitive cultural, social, and economic information on indigenous peoples' well-being aimed to secure incidence on policy, programs, research, and decision-making processes (Cariño, 2008).

During 2006 and 2007, the United Nations Permanent Forum on Indigenous Issues (UNPFII) and the International Indigenous Forum on Biodiversity (IIFB) led proposals for designing a global index on indigenous peoples' well-being, relevant life conditions, and concerns of indigenous peoples to influence the Millennium Development Goals (MDGs) and the CBD work. In 2015, the new Sustainable Development Goals (SDGs) and the CBD Aichi Targets adopted a framework more inclusive of indigenous peoples' concerns, but indigenous influence was still limited (IPBES, 2019b). Similar proposals about inclusive indicators were put forward, for example, in Canada the holistic health model advanced by the Assembly of First Nations (AFN), 2006 and in Aotearoa New Zealand the Mauri Ora framework

(Durie, 2001) and towards a Mâori Statistics Framework (Statistics New Zealand, 2008). Indigenous peoples have also designed culturally sensitive indicators at a regional scale, "Living conditions in the Arctic" (Andersen & Poppel, 2008) and at the local level, for example, the Tuawhenua tribal group in New Zealand (Lyver *et al.*, 2017). These have led to the recent development of indigenous ecosystem services valuation frameworks such as those emerging today in Canada, Australia and New Zealand. A small but growing movement is currently underway, in which IPLC scholars worldwide are calling for indigenous thinking to be recognised in developing indigenous and hybrid methodologies, all in the context of indigenous science and research and decolonizing methodologies (Chilisa, 2017; Pihama, 2010). Section 3.3.1.2 lists examples of indigenous and other approaches that are emerging to counteract dominant perspectives of knowledge creation of the last centuries. They represent an exciting space for improving current understanding of IPLC valuation and developing practices, protocols and methods for undertaking valuation in IPLC contexts.

Valuation for advocacy and securing of IPLC rights

With the backing and support of environmentalists, anthropologists and cultural ecologists, IPLC have utilised the power of valuation to lay claims on competing interests over their territories, to advocate for sovereignty over their lands, and to demonstrate the value of their practices and knowledge for biodiversity conservation (Orlove & Brush, 1996). Indigenous mobilisation and resistance have been deployed by indigenous peoples to make visible their worldview and understanding about their relationships with Mother Earth or territory (Ellis, 2005; Nazarea, 2006; Orlove & Brush, 1996). Indigenous peoples today mobilise and resist to safeguard aboriginal and environmental rights threatened by exclusionary extractive natural resource projects. Forest concessions, mineral extraction, dam construction, oil exploration, infrastructure development, violation of social and human rights have motivated massive demonstrations, occupancy of highways or towns, blockades, and other manifestations of civil disobedience (Borrows, 2016; Lackenbauer & Belanger, 2014). Athayde (2014) shows how indigenous resistance of Amazonian peoples as the Kayapo and Munduruku actively contributed and inspired social mobilisation against damming rivers for hydropower in the Amazon.

In recognition of these efforts and of the importance of bringing the IPLC perspective on valuation to light, this chapter attempts to explicitly include IPLC principles in the criteria for collection of evidence, in its analytical framework and assessment criteria, and in the designated assessment activities and evidence sources.

3.2.4.2 The evidence-base for IPLC valuation

Insights into IPLC valuation and IPLC valuation methods and approaches comes from a small body of literature that was obtained from three separate efforts by authors of the values assessment to collate literature on ILK relevant for the assessment. Thirteen publications were obtained from Chapter 3's systematic literature review of valuation practice between 1980 and 2020. In a wider call for contributions on ILK[25] that was made by the IPBES ILK task force, 8 out of a total of 420 contributions provided frameworks and approaches that were relevant for IPLC valuation. Finally, only 2 publications describing methods, approaches and frameworks were identified from a set of 265 academic publications that were part of a systematic literature review on global Philosophies of good living[26]. In-depth review of the 23 publications revealed that only 14 provide relevant information on IPLC valuation, mostly in the form of indigenous research frameworks proposing general approaches (i.e., not specifically about valuation of nature). for generating knowledge and understanding through indigenous worldviews.

Due to the paucity of published literature on IPLC valuation in English, a targeted call for contributions from contributing authors was conducted by approaching 76 IPLC scholars and ILK experts to request information specific to valuation methods and approaches. The contributions consisted of written essays (i.e., unpublished works) backed by evidence, 1000 to 1500 words in length. The essays responded to specific questions obliging experts to explore and describe the process of valuing and valuation of the communities that they belong to or work in. Out of the 76 solicitations that were made, 26 individuals returned essays. Descriptions and characterization of IPLC valuation described in the following subsections are informed by these essays. Although these 26 contributions covered a wide range of IPLC groups from all five IPBES regions and across different livelihood types, they represent a very small proportion of IPLC worldwide **(Figure 3.23)** and should not be generalised to all IPLCs.

3.2.4.3 General description of valuing processes in IPLC contexts

What is valued?

A total of 142 excerpts contributed to identifying and subsequently characterising the components of life and nature that become the subject of valuation exercises (i.e., the valuing processes) in IPLC contexts. After coding these

25. Call for contributions on indigenous and local knowledge (https://doi.org/10.5281/zenodo.4390417).
26. Philosophies of good living ILK cross-assessment case study (cross-chapter/ILK) (https://doi.org/10.5281/zenodo.4399544)

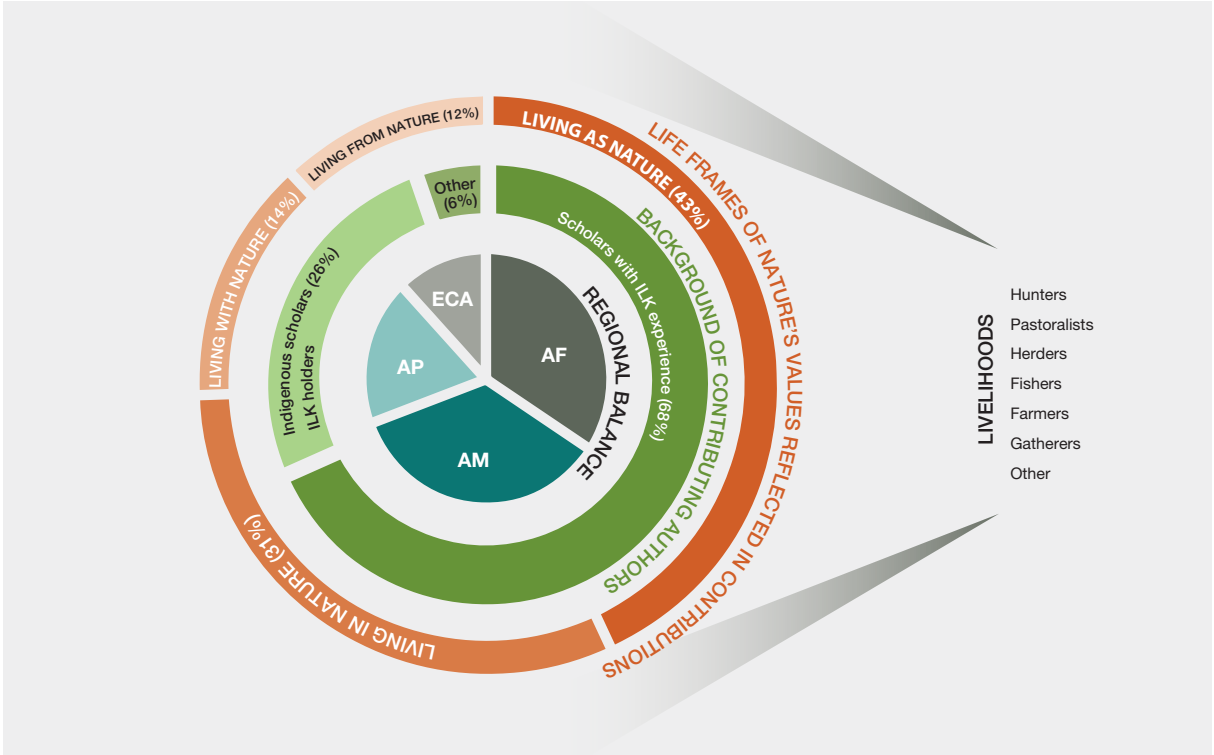


Figure 3 23 **Concentric circles describing the content of the contributions: Regional balance of the contributions across the four IPBES regions; Background of contributing authors; Life frames of nature's values and their relation to the communities livelihood strategies.**

AF = Africa, AM = Americas, AP = Asia Pacific, ECA = Europe and Central Asia.

excerpts we identified that out of the total of excerpts the following focus of valuation were mentioned, noting that one excerpt could express more than one focus of valuation: a) elements of nature itself including elements that might are not strictly considered as nature in western science contexts, such as the Moon and Sun, rain, rocks and the metaphysical (39%); b) material contributions of nature (35%) and to a lesser extent, non-material contributions of nature such as relationships with nature, physical & psychological experiences, aesthetics, spirituality, and identity (5%); c) natural processes including the regulating functions of nature such as water regulation, climate regulation, soil erosion control & soil fertility, regulation of hazards (13%); d) holistic elements of nature such as, spirituality, ancestry and beliefs which were a challenge to situate in the IPBES conceptual framework (8%); and d) good quality of life (0%) although many excerpts refer to good quality of life as the purpose of valuation **(Figure 3.24)**. They were characterised as holistic because – on the one hand – they associate elements of nature with nature's contributions to people and good quality of life; on the other, they integrate other aspects of life and the experience of living that are not time and space bound and not limited to the physical and tangible aspects of nature.

Holistic valuing is predominant among IPLC whose principal worldviews were living as nature and living with nature (see Chapter 2).

Figure 3.24 combines the results from the question "what is valued?" with value types and lists the full set of values that were identified in the excerpts. Note that a direct one-to-one relationship does not exist between the elements that are valued (the circles) and the types of values that emerge. One might be tempted to associate relational values, for example, with non-material nature's contributions to people. Or instrumental values to material nature's contributions to people. This is not necessarily the case, however. Also, one might assume that intrinsic values are only directed towards nature. However, as **Figure 3.24** shows, they represent only 8% of the value types identified while nature (as a value target) was mentioned in 24% of the excerpts related to *what is valued*. This example demonstrates the deep-rooted and holistic connection that IPLC have with nature, which is a key distinction between indigenous and western approaches of valuation.

A broad diversity of values and value categories were highlighted explicitly within the revised contributions. These

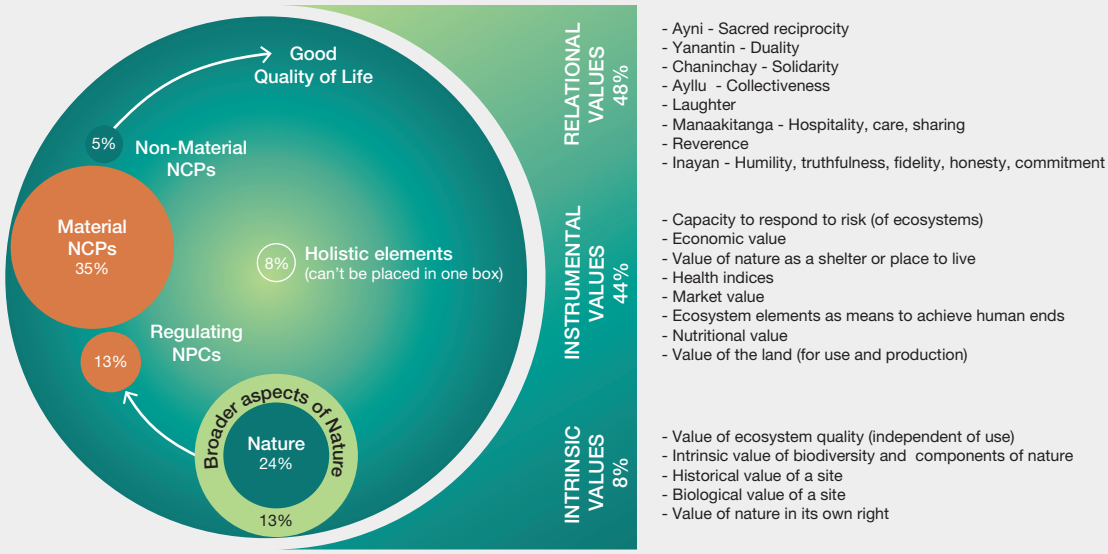


Figure 3 24 **Projection of the focus of valuation (what is valued?) by IPLCs and the types of values that IPLC valuation captures onto the IPBES conceptual framework.**

Note that the nature component includes broader aspects of nature that would not usually be considered as nature in non-IPLC contexts, such as the Sun and Moon. Also, that holistic elements at the centre cover in fact the full context. The size of the circles indicates the number of excerpts supporting the component from a total of 142 excerpts. On the right, types of values are indicated along with a list of examples that were extracted from the essays.

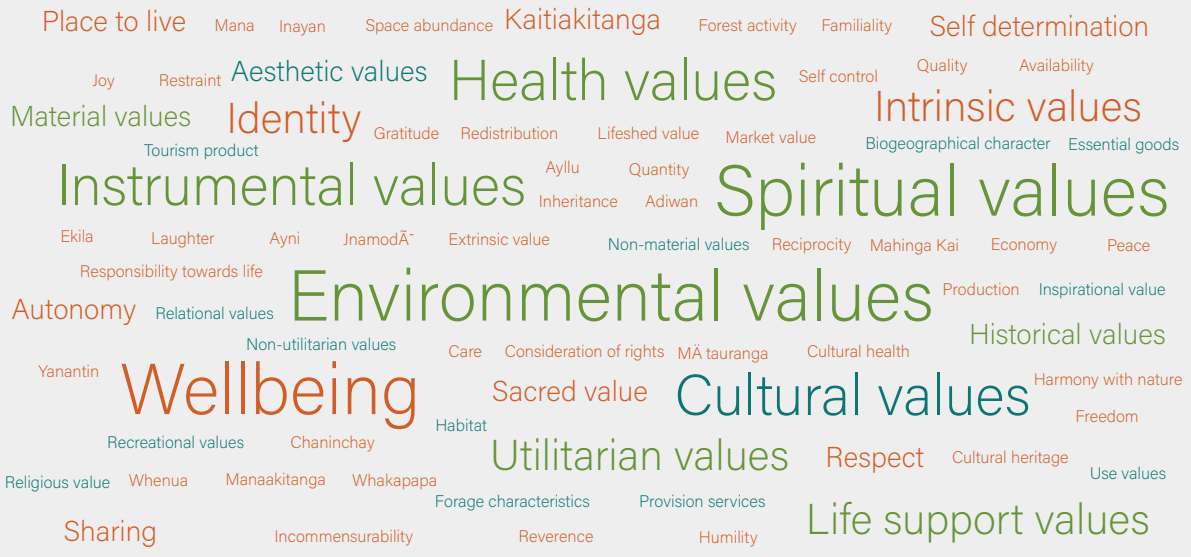


Figure 3 25 **Values reported by the contributing authors.**

In orange: values from communities with Human- Nature Worldviews; in blue values from communities with Non-Human- Nature Worldviews; in green values shared by both types of worldviews.

contributions were classified between those that reflect worldviews that address human-nature and non-human-nature relationships, values emerging from both types of worldviews and those that were shared among them were identified **(Figure 3.25)**. The contributions present a wide diversity of values made visible through indigenous methodologies and approaches that have implications for decisions regarding nature.

Some examples of the excerpts mentioning values are presented below[27]:

- Spiritual values: For Shona communities in South Africa *'In traditional Shona cosmology large trees are believed to be the dwelling place of ancestral spirits* (O'Flaherty, 1997). *Some animal species are also protected due to their spiritual value, for example the pangolin (Manis temmickii) (Virtanen, 2005). Most of such species-related controls are based on traditional religion, and they include both totem-related taboos and species that are connected to ancestral worship of witchcraft* (Mussanhane et al., 2000).' (Contribution 3).

- Environmental and health values: For Canadian First Nations '*This explains that while the natural environment is recognized as existing to serve the needs of the residents, the economic imperative is not the only consideration. Nature is considered to be valuable in its own right and environmental health is seen as symbiotically connected to human health and well-being. It is also important to emphasize that human health and well-being is conceptualized in a holistic way. Mental and emotional health is considered to be just as important as physical health.'* (Contribution 24).

- Sharing: For BaYaka communities *'Sharing is fundamental to these groups' sociality. BaYaka share even when there would seem to be no need to share, for instance, when huge amounts of fish are captured by everyone in the dry season; and they still share even if this means the producer remains with almost nothing. BaYaka explain that if they didn't share, their ekila would be ruined and they would no longer catch fish or find food.'* (Contribution 12).

- Cultural values: For the Ogiek communities *'Cultural and spiritual values shaped by the lands and territories'* (Contribution 21).

27. Analysis of contributions on values and valuation methods by ILK experts and holders (https://doi.org/10.5281/zenodo.4404612).

How values are manifested

A total of 213 excerpts from the essays conveyed information relevant for assessing how the process of valuing – or of enacting one's values – is manifested in IPLC contexts. Seven ways for expressing values were identified. Values can be expressed as appreciation of the world and components of nature; as daily decisions, actions and practices; as the exchange of goods and services in traditional markets; as how and which knowledge about nature is generated, shared and secured; as specific norms and regulations; as ethical principles, and; as belief systems. A brief description of each is provided in Annex 3.10 with some examples and their implication for valuation.

Although values are enacted in a number of different ways in all regions, most values are expressed as everyday decisions, actions and practices, and as beliefs **(Figure 3.26)**.

Contributions also highlight values as principles that feature prominently and regulate their day-to-day activities. Many

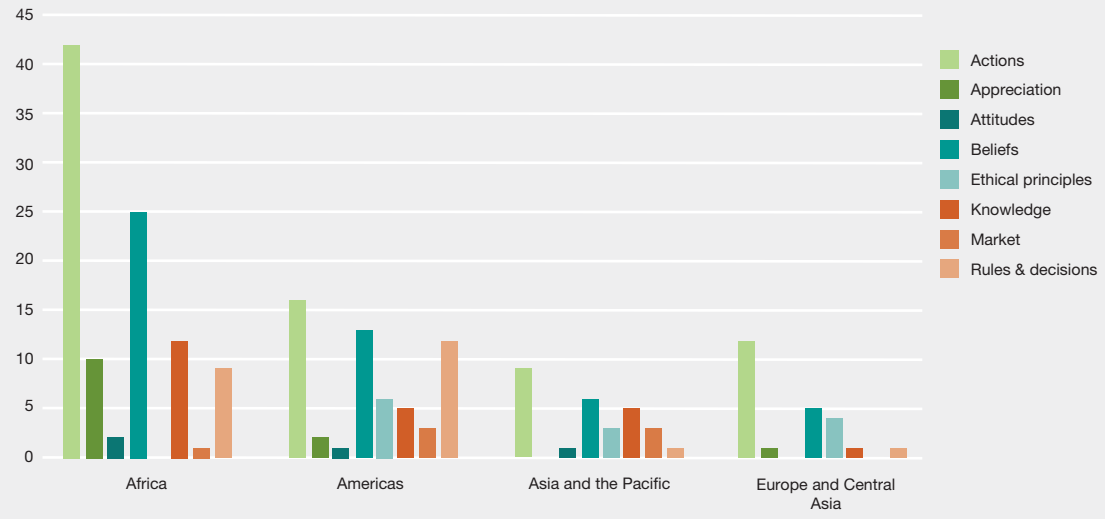


Figure 3 26 **How values are expressed and manifested in IPLC contexts.**

IPLC valuation methods assess these manifestations to make multiple conclusions about nature and human-nature relations in their communities. Values represent the number of excerpts from the 26 essays that conveyed these ways of value expression.

of these principles share key components and are usually connected to values such as *respect, reciprocity, sharing, caring, connection with nature and moral values*. For example, the BaYaka communities of Tanzania identify joy, food and "multi-species companionship" as the most highly valued virtues around which key cultural institutions and activities revolve (Contribution 12). In a similar vein, Quechua communities in South America identify sacred reciprocity, solidarity and duality with nature and with each other as the pillars of their existence and relations with one another (Contribution 13). Annex 3.11 provides additional examples from all the IPBES regions.

3.2.4.4 Description of valuation practice in IPLC contexts

The descriptions of valuation provided by ILK experts suggest that – in IPLC valuation – the boundaries between value expression, value elicitation and decision-making are more permeable and these processes are not necessarily linear. This makes it challenging to describe valuation as if it were a distinct and separate process from that of valuing and acting on those values; valuation is usually undertaken alongside other cultural processes. Additionally, IPLC valuation is oftentimes a collective process in which most – if not all – members participate and the values are elicited and assessed by all. Also, interpretations can be collectively discussed, and consensus is reached before the information generated can inform decisions. Some valuation is commissioned by leaders or community members for very specific purposes. However, other valuation is conducted with much less "formality" because it is part of the day-to-day activities of the "valuators" or valuation experts. Consequently, a wide range of individuals in the community are considered legitimate valuation experts who specialise in continuously assessing nature, human-nature and human-human relations and reporting this to individuals, leaders, or the whole community. Seers, interpreters, healers, Shamans, the community patrol teams, women returning from the farms, report their results to the community whenever it is needed and decisions about nature are made based on their assessments.

The purpose of valuation in IPLC valuation

Reasons for undertaking valuation in IPLC are numerous and can be grouped into 10 principal purposes **(Figure 3.27)** with the most frequently mentioned purpose was to generate, transmit and share knowledge about what is valued communally. Importantly, valuation is motivated by reasons that transcend the standard categories of reasons such as fulfilling human wellbeing, ecological sustainability, and justice objectives. Decisions and actions are usually part of a continuous interaction with the deities and non-human entities. When communities are not disentangled from their lands, then the environmental indicators, mandates from spiritual beings, and guidelines emerging within IPLC's settings are the ones that aid in decision-making to preserve nature. In other words, the information required for making decisions is not necessarily accessed through purposed observation, surveying, or measuring biophysical components of the environment, although these actions could be part of the process. Rather, valuation is often undertaken as part of a ceremony, to fulfil traditions and for educational purposes unrelated to decision-making *per se*. Valuations are conducted to celebrate life and share with human and non-human entities (which might be considered a dimension of human wellbeing), to fulfil individual and communal obligations towards nature as part of relational links, and to generate, transmit and share knowledge between community members and across groups.

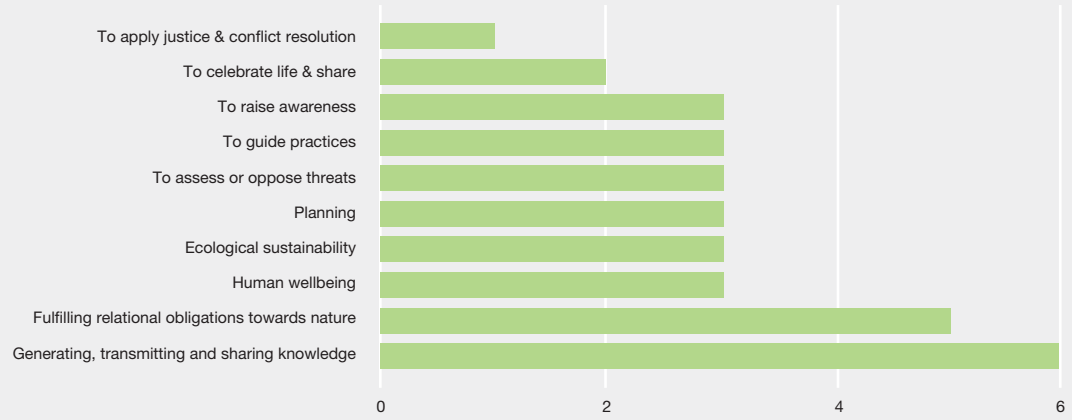


Figure 3 27 **The main purpose of valuation in IPLC contexts as described by ILK experts based on the number of essays that mentioned these purposes.**

Community members are the principal actors and influencers (see 6.1) triggering, leading and moderating the valuation process in their communities. Other key stakeholders are other local communities, civil society, religious stakeholders, national and subnational governors, non-governmental organisations, and researchers. When valuation is an IPLC-led process, valuation experts consist of people who are trusted in the community and who have the knowledge and skills to provide reliable information about values of nature. As such, the responsibility of generating information on values can be given to specific individuals or groups depending on their role in the community (e.g., leaders, chiefs), their age (e.g., youth, elders, cohorts), gender, skills or livelihood source (e.g., farmers, hunters, healers). In collective valuation processes, all community members participate as experts to provide and collectively assess information about values.

3.2.4.5 Methods and approaches in IPLC valuation

Applying the *methods families*: a western sciences perspective

The practices and approaches described by ILK experts in their essays were allocated to method families based on whether the process assesses values based on attributes of nature (nature-based valuation); or evaluates specific or broad values and worldviews based on statements and expressions (statement-based valuation) or based on direct and indirect observations of people (behaviour-based valuation). Valuation processes that combined information from more than one method family were grouped into the integrated valuation family. In many cases, it was not possible to identify a concrete method *per se.* However, descriptions of the conditions around the practice were

Table 3 9 **Applying the methods families framework to the practice of valuation in IPLC contexts.**

Valuation method Family	What is assessed?	The information used to detect, characterize or assign value (value indicators)	The general approach used to obtain and assess information (valuation approach)	The specific way that values are gathered and processed (valuation methods)	Additional practices or processes that may accompany valuation process
Nature-based valuation	• Ecosystem health • Land use change & its impacts • Ecosystem capacity to provide natures contributions to people • Weather (present and future) • Quality and amount of resource • Preparedness of nature for specific activities (planting, harvesting, migrating) • Threats and risks to Nature	• Species presence and absence data • Behaviours of plants and animals • Location and movements of species, people • Amount or quality or resource • Hunting success or failure • Changes over time and space • Inter- and intra-species interaction • Location of sacred spaces and features	• Territory Patrols • Forest walks • Ecosystem monitoring • *Ad hoc* reporting by community members of nature-related information • Can be collectively led, expert-led (specialized members) or cohort-led (e.g. by women, youth, elders)	• Direct observations of nature • Counts of components of nature • Discussions among experts (indirect information about nature) • Reading the skies & land • Tasting, touching, listening to nature • Mapping (including mental maps)	• Ceremonies • Occurring simultaneously with planning • Everyday practices such as fishing, hunting, farming, talking, fetching water, building • Protection of territory and resources • Affirming rights and autonomy
Statement-based valuation	• Strength or weakness of relations with nature • Sustainability of human-nature relations (harmony between humans-nature) • Attitudes towards nature and others • Nature's relations with people • Threats and risks to harmony with nature • Existence as People	• Feelings that people express through statements, song, poems, stories or dance • Natural phenomena • Other Signs from Nature in including dreams that people describe	• Group discussions • Community assemblies • Interviews • Rituals to gauge people's connection with nature • Prayers to gauge nature's connection to people	• Dialogues • Deliberation • Interviews • Mapping • Interpretation of nature's signs (what Nature has stated) • Interpretation of stories, dance and song (what people have stated) • Interpretation of dreams (what nature has stated to people)	• Ceremonies • Rituals • Planning • Decision-making • Conflict resolution • Teaching • Community strengthening processess

Table 3 9

Valuation method Family	What is assessed?	The information used to detect, characterize or assign value (value indicators)	The general approach used to obtain and assess information (valuation approach)	The specific way that values are gathered and processed (valuation methods)	Additional practices or processes that may accompany valuation process
Behaviour-based valuation	• Strength or weakness of relations with nature • Sustainability of human-nature relations (harmony between humans-nature) • Attitudes towards nature and others • Nature's relations with people • Threats and risks to harmony with nature	• What is consumed or appreciated about nature • Whether rules and principles are adhered to • How goods and services are traded • Hunting or crop failure or success (nature's behaviour) • What people do in the landscape • Changes in traditions and practices	• Expert-led assessments by specialized individuals • Communal assemblies to collectively interpret behaviours	• Observation of people and their behaviours in everyday practices and special occasions • Interpretation of intentions based on what people do (or do not do) • Characterization of human-nature relations based on individual or group behaviours	• Communal assessments of community harmony with nature • Conflict resolution processes • Evaluation and modification of Life Plans • Land use planning • Ceremony and convivial celebration • Communal cohesion building processes
Integrated valuation	• Knowledge and knowledge transmission • Existence as a People • The meaning and reason for Life • Threats to the existence of the collective • Opportunities for extending existence of the collective	• Specificities in the stories • Community behaviours and actions • Impacts on nature and the collective	• Collective process to discuss and deliberate • Ceremonies to develop and transmit knowledge • Rituals to affirm identity and sense of place	• Construction and sharing of worldviews • Interpretation of stories of creation • Retelling of stories of origin • A combination of processes embedded within one or several ceremonial procedures	• Empowerment processes • Protection of Territory • Enactment of Rights to self-termination and autonomy • Conflict resolution

used to identify the source of information used for the valuation and to assign a method family. **Table 3.9** summarises how descriptions provided by ILK experts were used to identify a method or approach and assign them to methods families. While this might facilitate western science understanding of IPLC valuation and make IPLC practices more conceptually available to readers, it grossly over-simplifies, omits, and most likely misrepresents the meaning and significance of the practices described.

Valuation as tradition, ceremony and practice: an IPLC perspective

IPLC's ways of life and their multiple human-nature and spiritual interactions with land and sea does not lend itself to delineated methods that are separate from daily and ceremonial life. Observed practices or procedures that might resemble methods associated with nature-based, statement-based or behaviour-based valuation can be an integral part of IPLC's ways of life intricately linked to their biocultural context. In this sense, these practices and approaches do not operate with a single purpose such as to collect information to support decision-making processes. Even when these practices are conducive towards decision-making settings, valuation and the decision process are not separated events; rather they are interrelated. Many practices and approaches are part of renewing relations with nature through the performing of, for example, seasonal water and food rituals and honouring landforms, plants, and animals. Some of the practices entail interpreting specific indicators emerging from nature to secure food and water for their own sustenance and the broader community; healing practices focused on the collective, family or community well-being; or consulting with deities to interpret their ancestral laws and elicit teachings to guide collective actions.

The fundamental limitation of applying the methods family approach to IPLC valuation is that it cannot fully capture and risks misrepresenting the interconnectedness of indigenous worldviews and their valuation practices. To illustrate, western scientific epistemology tends to place nature as an

external object of assessment rather than as a living being that people renovate relations of respect and reciprocity with. As an external object, *methods are applied to nature* with the specific purpose to value and assess natural resources and ecosystems services to humans. In contrast, many IPLC worldviews place humanity as an inseparable part of nature and subsequently, deploy a multidimensional and intimate relationship with nature that involves cultural identity and a sense of belonging, and collective well-being (Huambachano, 2018; Nemogá, 2019). Methods, as such, become impossible to extract from the practices, traditions and rituals that are carried out daily as part of the integral connections to the land and seascapes in IPLC's ways of life. Insisting that these practices are additional processes accompanying valuation is misleading.

For example, classifying IPLC procedures for determining physical or ecological characteristics of natural components such as soil quality or plant abundance as nature-based valuation methods, or interpreting processes of people expressing views about nature in collective gatherings and people singing or interacting through ancestral narratives as statement-based methods omits that in IPLC contexts, to speak, to listen, and/or to act upon Mother Earth would require to do so in accordance with ancestral law, values, and protocols that are localised and are not perceptible to non-community members. Applying a strictly western science approaches to understand IPLC valuation can omit that human-nature communication is often codified in signals or actions known by the community that might be imperceptible to an outsider (IPBES, 2019c). Moreover, in many IPLC contexts direct comparisons between IPLC and non-IPLC methods (such as equating talking circles to group discussions) can be inappropriate. For example, the place selected to discuss might be suitable for the intervention of deities who transmit messages or mandates, which may lack importance in non-IPLC contexts. The inclusion and specific role of other non-humans and non-material entities is key in IPLC valuation; but this easily escapes (and can be considered unacceptable) to those who are alien to an IPLC worldview and epistemology.

Limitations of applying the Methods Families to IPLC valuation practice

IPLC practices and approaches can be characterised as holistic, bringing together diverse values, including those contributed by non-human and non-material agents. Not recognizing this integrity and holistic feature of IPLC approaches and practices limits the much-needed participation of IPLC in exercises of valuation of nature. Although the methods family approach is instrumental in identifying IPLC practices and procedures that resemble non-IPLC methods it presents IPLC valuation practice

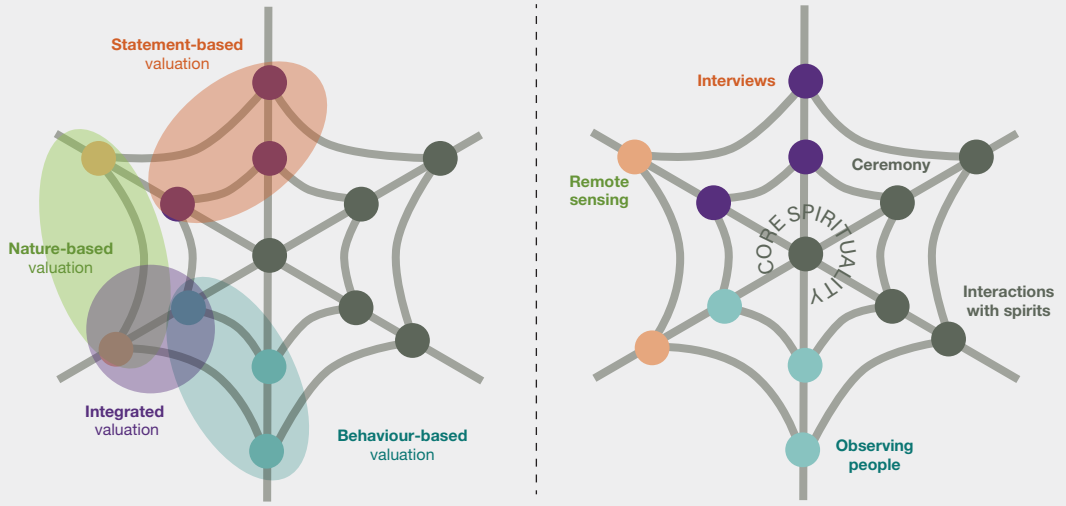


Figure 3 28 **On the left: Visual representation of how the methods families (statement-based, nature-based, behaviour-based, and integrated) act as a selective lens to make only isolated elements of IPLC valuation visible to the IPBES audience.**

The structure of the web itself and each node (circle) together represent a simplified example of an IPLC worldview in which valuation takes place as a multi-faceted and on-going process. On the right: Three examples (interviews, remote sensing, and observing people) of how the method families accesses or represents elements of IPLC valuation. Two examples of integral elements of IPLC valuation not accessed or represented by method families are ceremony and interactions with spirits. The spirituality core of the IPLC worldview is central in the figure and cannot be removed without dismantling the integrity of the rest of the web. Figure adapted from Casimirri, 2003.

out of contexts; core cultural and spiritual beliefs and practices of IPLC run the risk of being excluded from valuation of nature exercises **(Figure 3.28)**. Bringing together non-indigenous valuation methods and indigenous practices and approaches requires acknowledging diverse worldviews on equal footing. If IPLC are going to engage in valuation of nature exercises, co-valuation will be a respectful way to go. Co-valuation of nature, rather than integration, promotes a suitable space for bringing together multiple value dimensions and worldviews if grounded on meaningful and respectful complementarity (Šunde *et al.*, 2018).

The methods families are limited in their ability to acknowledge and characterise IPLC practices and procedures and how they operate within their everyday life or ceremonial relations to the land. **Figure 3.28** shows that simply filtering IPLC procedures and practices through the method family's framework does not reflect IPLC perceptions and their relationships to nature. Consequently, only the components of IPLC valuation methods that fit through the methods family filter, such as elements of nature-based, statement-based, behaviour-based, and integrated methods that are recognizable by the western perspective, will come through and be represented. Similar to what Casimirri (2003) stated regarding the integration of Traditional Ecological Knowledge (TEK) in resource management: if practices and procedures of IPLC are used only to provide data to enrich a western valuation method, even if it is interdisciplinary, it will not represent the values, neither it will serve the needs of the providers of that information.

3.3 KEY CONSIDERATIONS IN VALUATION

This section outlines key considerations in the choice between alternative valuation processes to support decision-making. We outline three considerations that together can guide valuation choices: 1) relevance, 2) robustness and 3) resources. The relevance criterion seeks to draw out key considerations related to how application of valuation methods and approaches can make different types of values visible for decision-making in diverse contexts. The relevant methods and approaches are those that provide information on the values that matters for a given decision-making situation. The robustness criterion includes how methods can generate reliable information and fairly represent values of a broad range of stakeholders. The resource criterion relates to the resource needs involved in the application of valuation methods and approaches in terms time, financial resources, data availability, human resources, and technical capacities.

3.3.1 Relevance of the valuation

The section has three components, the first considers how different goals for valuation also render different types of valuation relevant. The second aims to bring evidence together on how valuation has included different forms of knowledge systems and worldviews and in particular indigenous peoples and local communities' principles in valuation. The final section provides the evidence on how plural valuations aim to bring the different types of values together into a common framework or support for decision-making.

3.3.1.1 Counting what counts: societal goals of valuation

Valuation seeks to support decision-making by addressing overarching societal goals. We group societal goals into four main goals to evaluate the extent to which valuation applications provide evidence to inform decisions about the consequences of interventions to human well-being, ecological sustainability and justice, as well as a more holistic integrated goal, based on IPLC worldviews. Enabling decision-making to improve human well-being is a key intended goal that valuation seeks to achieve (e.g., Guerry *et al.*, 2015; Keeler *et al.*, 2012; Kenter, 2016; Rendón *et al.*, 2019). Different valuation approaches use different concepts to measure human well-being, including quantitative and qualitative indicators (Bernues *et al.*, 2014; Busch *et al.*, 2012; Walz *et al.*, 2016).

The concept of *human well-being* is used as an equivalent to a "good quality of life" at individual, household or community level in line with the IPBES conceptual framework (Díaz *et al.*, 2015). Empirical studies may use several measures of well-being (Dawson & Martin, 2015). Applications often assess one or more of the diverse *items* that are considered important for a good quality of life, e.g., health (mental and physical), food, education, living standards (such as housing conditions, ownership of assets, access to drinking water and electricity, etc.). Sometimes these are combined into composite indicators of well-being (McGillivray & Noorbakhsh, 2007). Other valuation applications assess subjective well-being defined as *'fulfilling one's virtuous potentials and living as one was inherently intended to live'* (life satisfaction, happiness, optimism about one's future etc.) (Diener *et al.*, 2002). Economic valuation methods tend to be based on the theory of utilitarianism and assess changes in utility as a result of a change in nature or biodiversity (Tinch *et al.*, 2019). Other studies do not measure well-being directly, but use livelihoods as a measure and assess the dependence on land and natural resources as an indicator of how human well-being depends on nature (Gobster, 1999).

Valuation also seeks to inform decision-making about the impact of changes in nature by measuring *preferences or*

importance assigned to (changes in) nature and biodiversity protection or utilisation. Valuations use different well-being indicators in this type of valuation such as willingness to give up access to land or other resources to protect nature (Lliso *et al.*, 2020) or willingness to pay to protect nature or improve ecosystem services (Meyerhoff *et al.*, 2009), while others are rankings of relative importance of aspects of nature and biodiversity (Martín-López *et al.*, 2012) or qualitative indicators of importance linked to nature, biodiversity and well-being (Durie, 2001; Harmsworth *et al.*, 2011; Huambachano, 2018). Finally, *costs* associated with protecting nature and biodiversity or maintaining nature's contributions to people, of either past or future projects are used as (second-best) approximations of how important and valuable nature and biodiversity are to people (e.g., Marre & Billé, 2019; Schleiniger, 1999; Schröter *et al.*, 2014) (see 3.2.2.3).

Providing information to achieve a higher level of *ecological quality* is also an important focus of valuation (see 3.2.2.1). Valuation can be aimed at assessing whether the use or management of nature and nature's contributions to people is done sustainably regarding the carrying capacity of the ecosystem considered (Gobster, 1994). Ecological sustainability here refers to the capacity of an ecosystem to support the ecological processes required to deliver nature's contributions to people for present and future generations (Costanza, 1999; Opdam *et al.*, 2006). Three sub-criteria were selected to give insight on how valuation applications provide information about ecological sustainability:

- ***Ecosystem condition*** refers to (aspects of) the ecosystem of the natural world *regardless of their use, services for or contributions* to humans. Although this includes conservation-related biodiversity values or ecosystem regulation studies from biocentric or ecocentric perspectives, which *relate* to humans, such applications are still about *how the ecosystem itself is doing*. Related concepts include ecosystem health, healthy functioning of ecological processes, resilience of ecosystems, response to perturbation, naturalness, biodiversity (not related to human use), threatened species, extinction risk, degradation, impacts of drivers on the ecosystem, etc. Measuring ecosystem condition is considered an essential component of any assessment of the ecological impact of use or management.

- ***Ecosystem capacity*** refers to the *potential or actual delivery of ecosystem services/ contributions to people* (Opdam et al., 2006). It also includes biodiversity studies which refer to human utility, e.g., biodiversity assessment of rainforest patches for pharmaceutical exploration, or biodiversity of grassland species related to nutritious value for cattle. It does *not* include studies of just the benefits to people without assessing the ecosystem. Related concepts include ecosystem service potential, stocks, ecosystem service supply, flow, delivery, use, nature's contributions to people, viable populations of "useful" species (habitat suitability), biodiversity (related to a human use, functional biodiversity), quantity or quality of natural resources (related to a human use), etc.

- ***Sustainable use and management of ecosystems*** both require combining aspects of ecosystem condition with aspects of ecosystem capacity, including an aspect of impact of management or use on this condition. These concepts however differ. *Sustainable use* implies meeting human needs without compromising the health of ecosystems (Callicott & Mumford, 1998; United Nations, 1987); whereas *sustainable ecosystem management* is about restoration and maintenance of the ecological structure and function of ecosystems and preservation and enhancement of the health and diversity of species and ecological communities (Gobster, 1994; Harmsworth et al., 2011). Related concepts include ecological thresholds, boundaries, tipping points, maximum sustainable yield or harvest, carrying capacity for human use, restoration, conservation effectiveness, etc.

Justice as an objective in environmental policy can be considered in valuation either in terms of fair distribution of benefits or burdens of policies (distributional justice). It is in this meaning that we consider justice in this section. Just valuation is also important in terms of how to achieve more fair valuation processes (procedural justice). How valuation considers recognition of different value systems (recognitional justice) is the topic of Section 3.3.1.2.

Distributive justice concerns the fair distribution of costs or losses and benefits or gains, i.e. the outcomes of policies (McDermott *et al.*, 2013). The evaluation assessed whether applications provided evidence of **intragenerational** justice, i.e., the distribution of ecosystem services/ nature's contributions to people wealth and resources (gains and losses) *within one generation*, and **intergenerational** justice, i.e., the distribution of ecosystem services/nature's contributions to people wealth and resources (gains and losses) *across generations*. In the review of applications, information was collected about how distributive justice was assessed, for example through disaggregation (across generations or stakeholder groups), inequality indices, or perceptions of distributive justice and needs of future generations.

From the systematic review it is clear the ecological quality in terms of its importance both in itself and to contribute to people is by far the most prominent goal that valuation seeks to inform **(Figure 3.29)**. Assessing human well-being more directly is the primary goal of approximately one third of valuations, whereas evidence on the assessment of distributional justice is relatively scarce **(Figure 3.30)**.

Figure 3 29 **The stated goals of valuation and the approaches to target these (systematic in-depth review n=1163).**

Note that goals often overlap, and that this abundance is based on the valuator's interpretation on what is assessed.

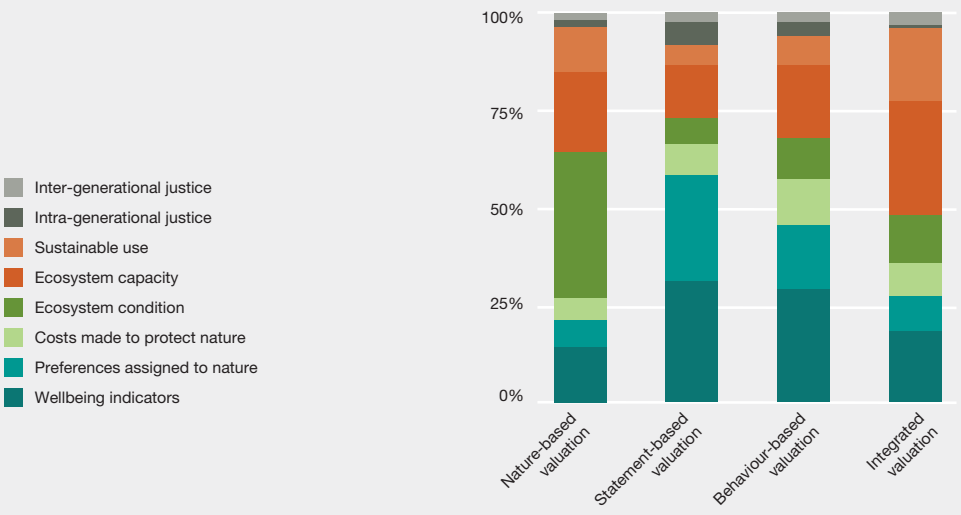


Figure 3 30 **The stated goals of valuation and the approaches to target these (systematic in-depth review n=1163) associated to methods families.**

Note that goals often overlap, and that this abundance is based on the valuator's interpretation on what is assessed.

The review shows that the goal of the valuations relying on nature-based valuation methods is largely to assess ecosystem capacity and condition as well as sustainable use but that they also often report on wellbeing indicators as part of the study **(Figure 3.30)**. Valuations using statement-based and behaviour-based methods as the main approach to elicit values predominantly aim to assess wellbeing through wellbeing indicators, preferences and costs to articulate values of nature. However, these methods also often have an explicit goal to improve biophysical properties of nature **(Figure 3.30)**. Integrated valuation to a larger extent has a mix of expressed intended goals of the valuation.

Valuations explicitly assessing distributional justice are less abundant in the literature than valuations assessing other societal goals (see above). However, the evidence of the importance that people place on fairness as a broad value underpinning specific values of nature is important for assessment of the capacity of methods reviewed in Section 3.2. It is well evidenced that lower distributional fairness is associated with, for example, lower social welfare and negative health effects (Wilkinson & Pickett, 2009). Additionally, it has also been well demonstrated that people have preferences for more equitable outcomes and do regard the welfare of others in their preferences and behaviour (Gsottbauer & van den Bergh, 2011; Johansson-Stenman & Konow, 2010; Konow, 2010; Nyborg, 2000). There are different methodologies available in valuation to assess how people value fairness, in terms of the distribution of benefits, resources, opportunities, or rights. This holds for both intergenerational and intra-generational distribution.

Ex-ante studies aim to understand such social preferences, including altruism and distributional preferences. It is well established that participants in statement-based methods, including choice experiments and contingent valuation studies, are willing to pay to protect biodiversity and conserve nature for future generations (such values are sometimes labelled 'bequest values') and for current generations living in other locations to enjoy even if they cannot enjoy these themselves (altruistic non-use values) (Nobel *et al.*, 2020; Oleson *et al.*, 2015; Subroy *et al.*, 2019).

In other valuations using statement-based methods (focus groups, questionnaires, choice experiments), stakeholders are directly asked about their preferred distributional rules, such as who should get the highest payments in payment for ecosystem services schemes (Martin *et al.*, 2014); whether to ask higher payments from richer citizens to support poorer citizens (Rodríguez & León, 2004); how to allocate agricultural subsidies across farmers (Rocamora-Montiel *et al.*, 2014); or how to distribute climate change mitigation efforts (Carlsson *et al.*, 2011, 2013) or payments for air quality improvement and carbon taxing (Dietz & Atkinson, 2021) across different countries. This approach is also used to assess how people would prefer to distribute environmental benefits over time out of intergenerational equity concerns (Spyce *et al.*, 2012). Another approach is to ask respondents in questionnaires how likely they are to contribute to fairer allocations, for instance by buying organic products with different profit distributions in the value chain (Chang & Lusk, 2009). These valuations regularly find that people opt for some level of fairness in distribution, but according to different principles: sometimes by allocating across a larger group, sometimes by allocating funds to those who need it most, to those who are least responsible for the environmental problem at hand or contribute most to better outcomes. However, the number of studies that focus on environmental valuations is small and many valuations fail to consider distributive justice (Garmendia & Pascual, 2013). An important knowledge gap for sustainability-aligned policies is the lack of empirical studies that assess how different users/stakeholders value different gains and losses in seeking a fair allocation in progress towards their multiple and sometimes conflicting objectives (Forsyth & Sikor, 2013).

Another set of experimental studies using games, where participants are asked to share resources with others, has extensively shown that moral norms and fairness concerns affect people's distributive behaviour (Andreoni & Bernheim, 2009; Cappelen *et al.*, 2007; Dreber *et al.*, 2013; List, 2007), and that people are averse to inequity (Fehr & Schmidt, 1999). However, while these preferences are well evidenced in lab and field settings, such evidence in the context of valuations of ecosystem services/ nature-based solutions is sparse.

Furthermore, ex-post studies assess the distribution of gains and losses across stakeholders by disaggregating findings across these groups, such as the gains of protected areas for tourists against the losses of local communities in access to resources and spiritual places (van Beukering *et al.*, 2003). Other studies focus on the gains and losses along the value chain (Ribot, 1998). Again, while it is widely acknowledged that such disaggregation is important for sustainable solutions, the evidence base of studies that do so is small.

3.3.1.2 Recognition of diverse knowledges and worldviews

In socio-environmental justice, recognition consists of: 1) acknowledging the existence of other ways of life, different ways of knowing, and different ways of generating knowledge, and 2) respecting those differences (Schlosberg, 2007). For this assessment, valuation practices were assessed for the extent to which they acknowledge and respect different ways of knowing and valuing nature and recognizing the different worldviews that underpin variations in knowledge systems. Recognition was used to assess whether valuations reproduce the societal structures that contribute to social injustices in the form of lack of respect,

discrimination, and domination across social fault-lines such as gender, sexuality, and ethnicity (Martin *et al.*, 2015).

Consideration of diverse knowledge systems in valuation

Most valuations that are published in scholarly outlets are conducted by academics or researchers including students, hence most of the knowledge that informs valuation originates from academia, albeit from different disciplines (see 3.2.1). Almost 30% of valuations rely, incorporate, or – at the very least – acknowledge knowledge other than that from academia such as, lay and experiential knowledge, indigenous and local knowledge, technical knowledge (excluding academic) and policy knowledge (i.e., knowledge that generated and maintained in the policy domain) **(Figure 3.31)**.

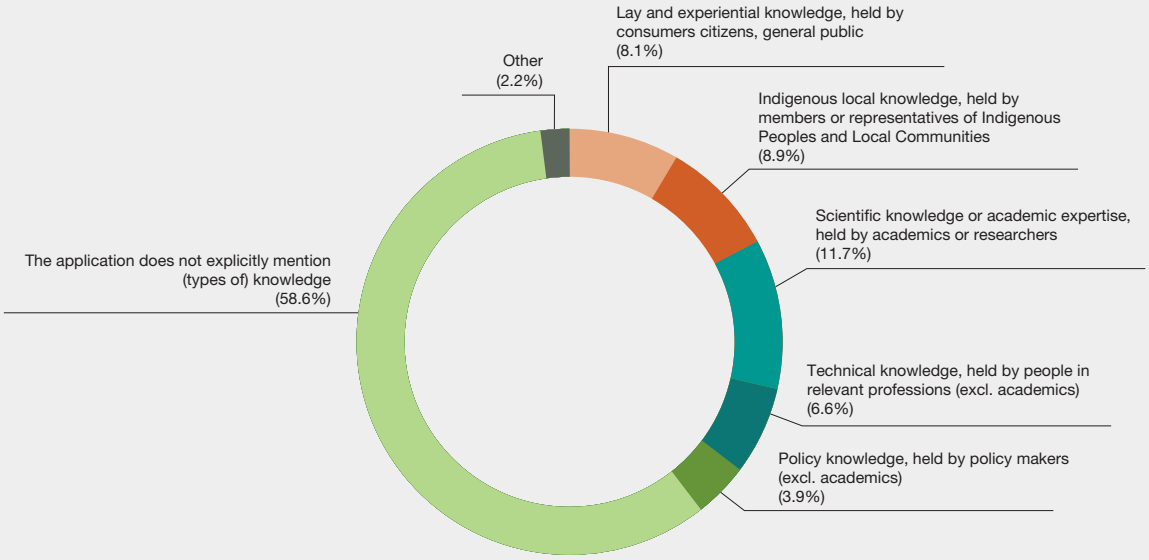


Figure 3 31 **Proportion of valuation studies that mention reply of different types of knowledge (n = 1163).**

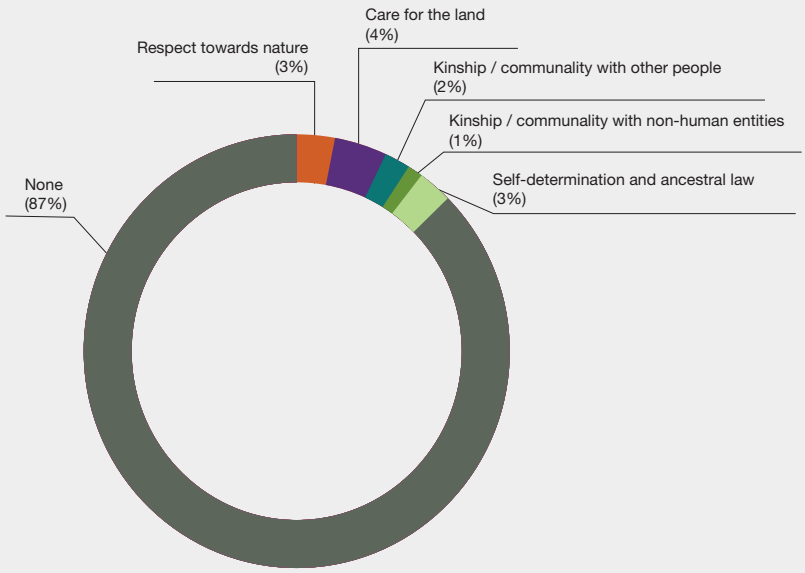


Figure 3 32 **Proportion of valuation studies that mention key IPLC principles guiding their relations with each other and with nature (n=1163).**

Valuations that interact directly with knowledge holders from extra-academic domains invariably recognise other knowledge systems, at least implicitly if not explicitly. Specifically, participatory valuation approaches depart from the notion that the knowledge and experiences of others is valuable to the valuation exercise. Nonetheless, knowledge systems that inform valuation are not explicitly acknowledged in reports or given equal importance. The low explicit recognition of other knowledge systems risks perpetuating existing dominance of academic knowledge.

Approximately 41% of reported valuations were explicit about the types of knowledge that informed their studies. In the case of indigenous and local knowledge and the knowledge of other marginalised groups, 8.9% of the studies referred to ILK, and this is even though only

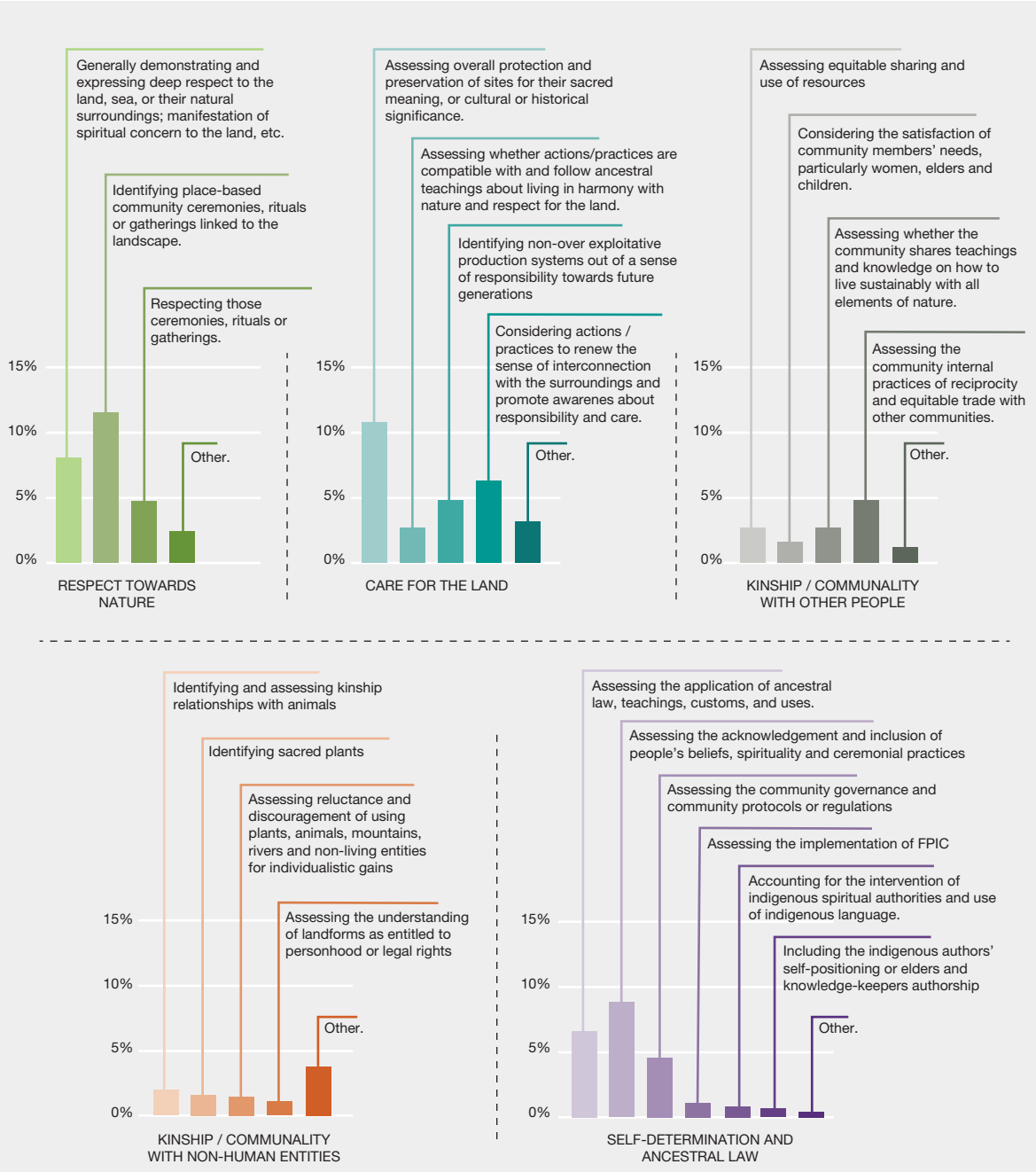


Figure 3 33 **Recognition of broad principles across all valuations (n=1163).**

The levels indicate the proportion of valuations that assessed or identified elements of five principles that guide IPLC's relations to nature. Note that these also include the valuations not related to IPLC territories or communities.

2% of the studies had been conducted in the territories of indigenous peoples and local communities. Lastly, 8.1% of the studies referred to lay and experiential knowledge, such as that which is generated and held by consumers, citizens, or more broadly, the "general public" **(Figure 3.31)**.

Consideration of indigenous people and local communities' principles in valuations

Reciprocity, generosity, altruism, kinship, self-determination, and self-governance are key guiding principles in many Indigenous Peoples' way of life. Valuation studies were assessed to determine the extent to which all or some of these principles are acknowledged in the work that is reported. Only 13% of the studies mentioned at least one of the principles; principles associated with respect towards nature, care for the land, and self-determination and ancestral law were the most common **(Figure 3.32)**. Not all studies where the principles occurred were necessarily conducted in the IPLC territory or communities, suggesting that some of the principles (particularly care for the land and respect towards nature) guide other non-IPLC societies. The principles of stewardship, altruism, and guardianship have been used to explain caring behaviours towards nature in non-IPLC societies such as recycling, volunteerism and giving to donations **(Figure 3.33)**.

Emerging methodologies to address low recognition of other knowledge systems

Indigenous scholars and scholars from other marginalised groups are developing new and hybrid research methodologies that build on their philosophies and knowledge systems and follow their own processes of validation. This growing field offers opportunities for indigenous and other scholars to develop valuation methods that are better suited for IPLC contexts and which respect and promote their culture, traditions and values. There is a small but growing body of indigenous scholarship that is raising awareness to the broader scientific community in understanding indigenous cosmovision/worldview (see examples in Annex 3.12).

3.3.1.3 Plurality in valuation

Plural valuations elicit and integrate diverse values

Many valuation applications aim to make *diverse values* explicit in a joint valuation process. Value diversity is fully embodied within the IPBES conceptual framework (Díaz *et al.*, 2015) where three main value dimensions are considered: (1) values directly linked to nature itself (including biodiversity and ecosystem structure and functioning); (2) values derived from nature's contributions to people (including ecosystem services) (Pascual *et al.*,

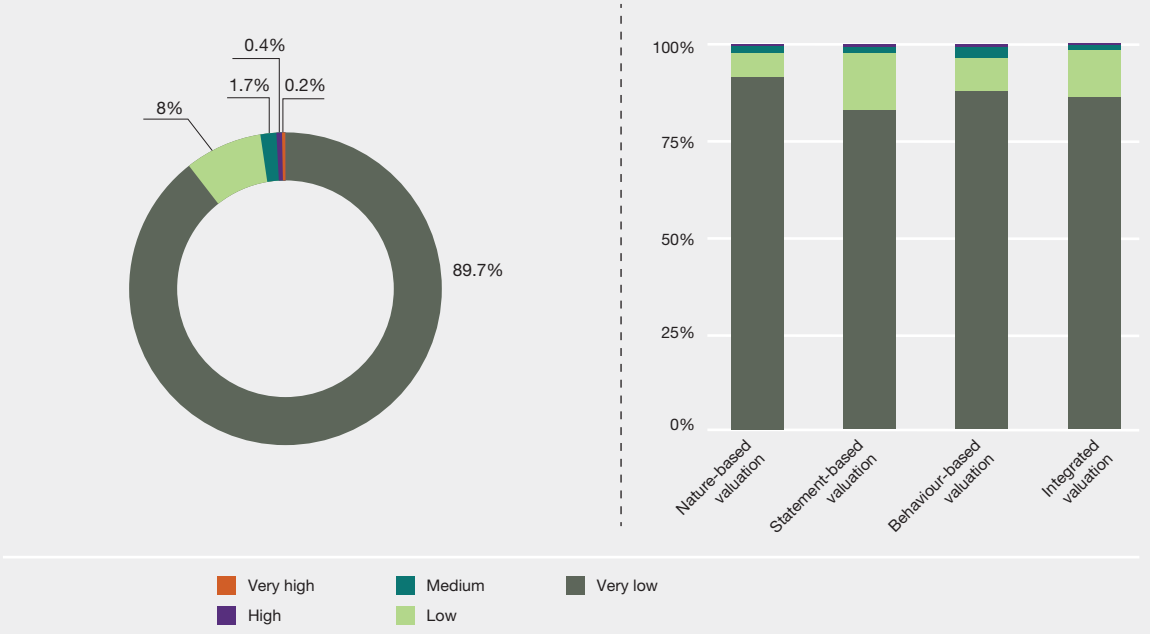


Figure 3 34 **Level of broad plurality of valuations (n=1163, right: relative per method family).**

The levels indicate the number of life value frames, Total Economic Value main categories and IPBES value dimensions. Very low: valuation considered from the perspective of a single life value frame, Total Economic Value category and value dimension. Very high: three or more value frames, Total Economic Value main categories and IPBES dimensions are considered.

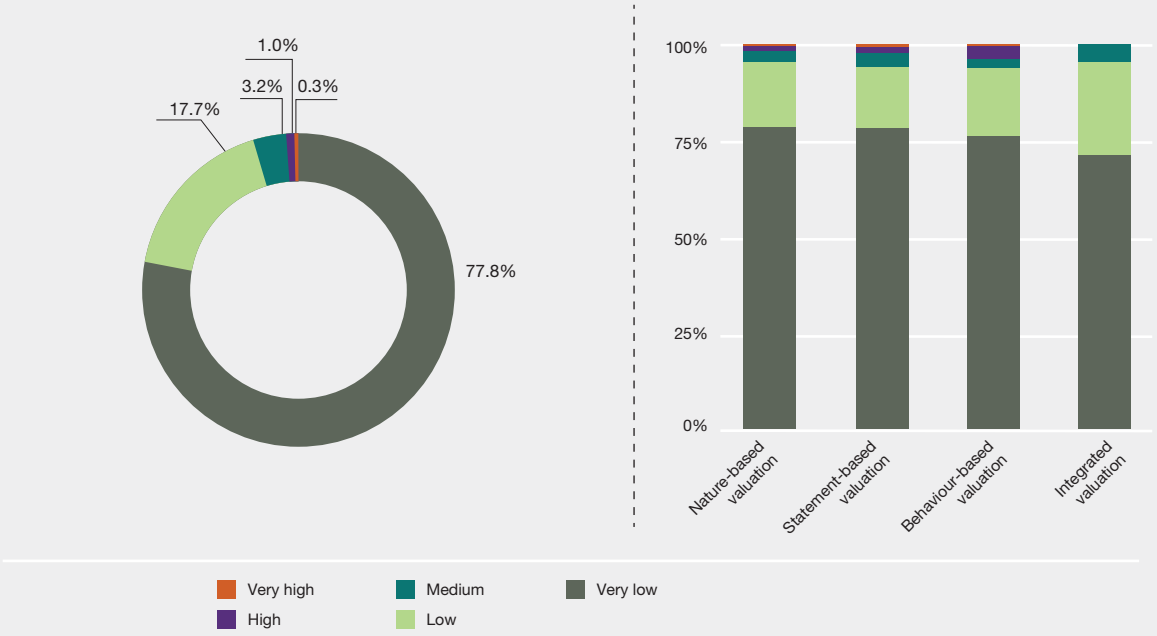


Figure 3 35 **Level of specific plurality of valuations (n=1163, right: relative per method family).**

The levels indicate the number of value targets considered in the valuation. Very low: valuation targets less than 5 components of biodiversity, nature's contributions to people types and aspects of quality of life. Very high: valuation targets at least 25 components of biodiversity, nature's contributions to people types and aspects of quality of life.

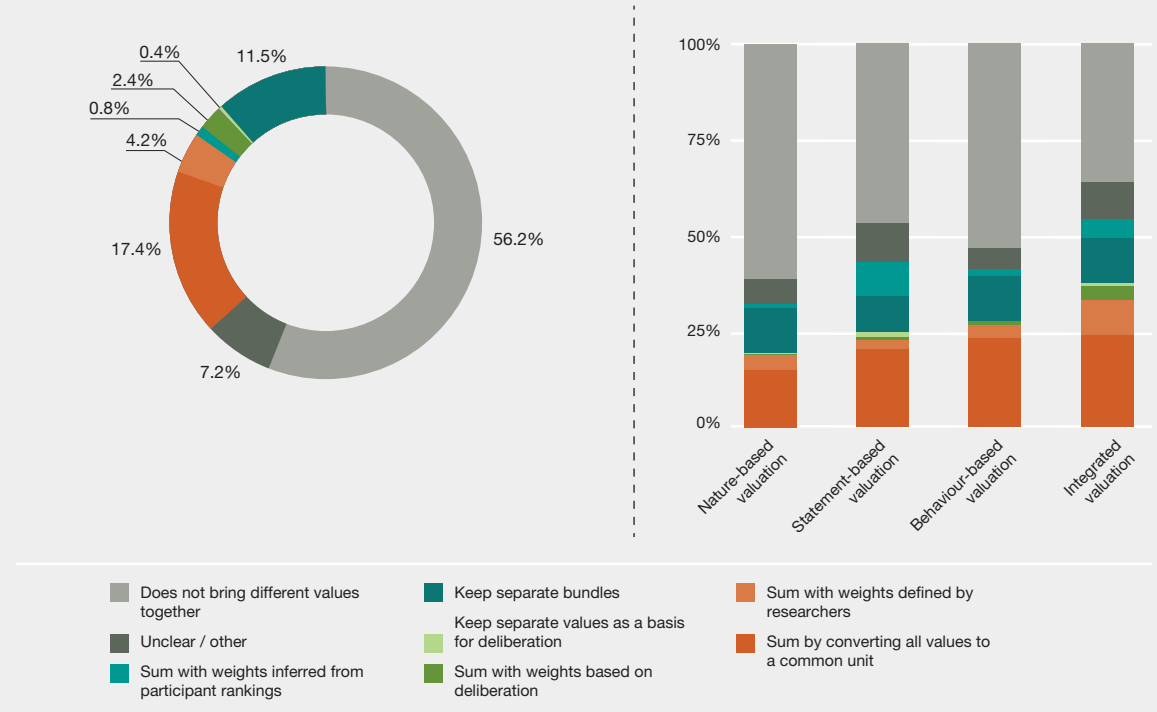


Figure 3 36 **Ways in which valuations have combined different value types (n=1163, right: relative per method family).**

2017) ;and (3) values more directly linked to good quality of life (see 3.3.1.1). In the values assessment, the value typology is further broadened, detailed and developed (see Chapter 2). An important distinction is made between broad and specific values. *Broad values* refer to the underlying perspectives, worldviews and life value frames which underpin a potential valuation. A valuation which considers several of these broad values (e.g., considering economic considerations and IPLC perspectives in the study), is a plural valuation in the broad sense **(Figure 3.34)**. *Specific values* are for instance as components of biodiversity, types of nature's contributions to people and indicators of quality of life (see IPBES, 2018). A valuation which considers several specific values has a high specific plurality **(Figure 3.35)**. Most valuations account for some degree of plurality, but only a minority of valuation can be considered highly plural, either in a broad or specific sense. 75% of the 1163 in-depth reviewed valuation studies focus on more than one type of value related to different aspects of nature, its contributions to people and a good quality of life yet, only 10% address more than one life frame of nature's values (i.e., living from, with, in and as nature). Figures above depict the abundance of valuations over aggregated levels of plurality for specific **(Figure 3.34)** and broad **(Figure 3.35)** aspects.

Our review recorded if and how applications bring diverse values together. In practice, 56% of valuations do not bring different values together. 17.4% of plural valuations consider diverse values as comparable and sum them in a single summed unit. 7% applies some weighting between value types assumed to be compatible, and 12% keeps value types separate or in bundles to inform decision-making **(Figure 3.36)**.

Deliberation has also been suggested as a useful process in valuation where decisions involve multiple value types: it is seen as a legitimate approach to bringing diverse values together in a joint decision process to arrive at a consensual decision (Raymond *et al.*, 2014; Vatn *et al.*, 2011). Incommensurability debates have also had implications for the technical tools proposed to evaluate policy proposals. In particular, multi-criteria-based valuation methodologies have been advocated to enable some relaxation of the assumption that value commensurability underpins conventional valuation approaches (Munda, 2004; Spash, 2008). Furthermore, multi-criteria methods have been more applicable in a wide range of situations where economic estimates have not been available and infeasible/impossible to estimate for many of the relevant impacts.

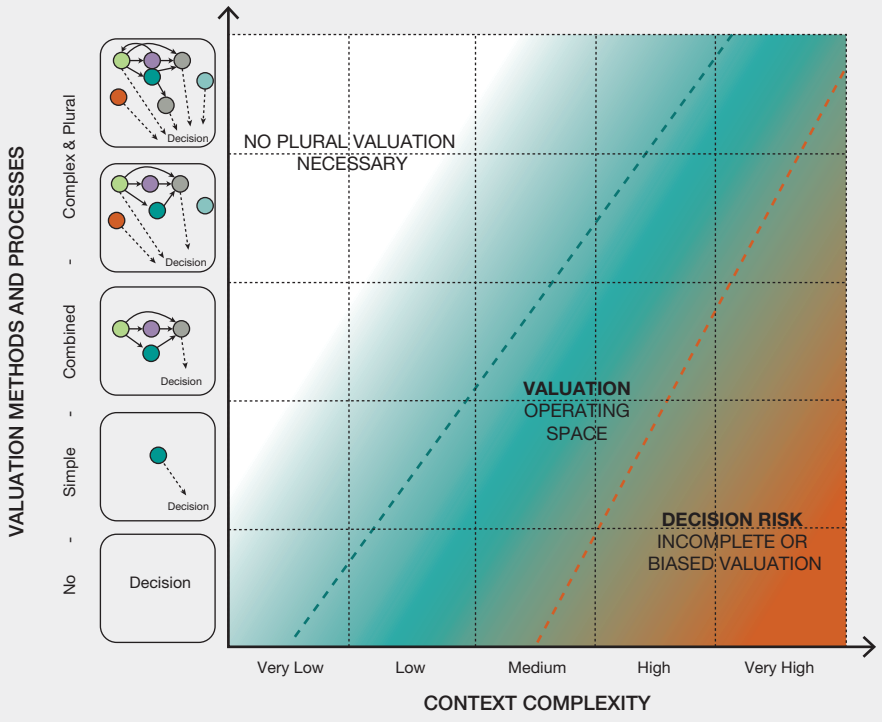


Figure 3 37 **The valuation operating space: valuation methods and processes from 'none' to 'plural' as a trade-off between decision risk and resources spent on unnecessary valuation.**

Plural valuation in practice

Some single valuation methods can identify diverse values to some degree, yet specific methods exist to elicit use, non-use and option values, various contributions of nature, aspects of biodiversity and quality of life; but also, broad values related to life frames of nature's values, dimensions such as instrumental, intrinsic and relational, and IPLC principles.

Capturing a richer diversity of values in valuation can thus be achieved by combining several complementary methods. The use of multiple methods requires careful consideration, since their underlying assumption and disciplinary origin can make some methods incompatible with one another. Despite the wide range of methods available, most valuations only apply one main method, and combinations mostly have methods from the same discipline. 77% of the valuation studies use one main method or a combination of approaches within the same method family. On the other hand, many 'additional methods' are applied to broaden the scope of a main method. While these are not standalone methods and often embedded in the protocols of the main method, they complement the main method to achieve a certain degree of plurality. Examples are the use of a biological diversity map alongside observations of recreation patterns, or the deliberative process applied to design a population-wide survey. In practice, consulting experts from different disciplinary backgrounds can help select the appropriate method mix to produce results which are relevant to the decision at stake.

Mixed method approaches however are demanding regarding skills, resources and time. The choice to increase investment in the valuation process depends on the complexity and stakes of the valuation context: high stakes and high complexity justify investing in a more complex and demanding valuation. The operating space for valuation is determined by risk and parsimony **(Figure 3.37)**. Underinvestment in valuation risks to misinform decisions and produce adverse effects. Parsimony on the other hand advises against using more resources and time than justified by the benefits or losses at stake. Note that for choices of low complexity and stakes, no explicit valuation might be needed at all, and for medium complexity and stake, often a simple valuation might suffice.

3.3.2 Robustness of valuation

In valuation, robustness is a multi-dimensional criterion that includes how methods can generate *reliable information* and *fairly represent values* of a broad range of stakeholders. The reviews on valuation methods undertaken in this chapter highlight that valuation experts have different perspectives on how to improve the robustness of valuation outcomes. The different perspectives offer insight to the development of valuation going forward but disagreements about what reliable information is may also hinder the use of valuation in decision-making.

In particular, the evolution of statement-based valuation has focused on improving methods to generate more reliable valuation outcomes mainly by improving elicitation procedures (see 3.3.2.2, 3.2.2.2). This has resulted in widely available best practice guidelines for use in decision-making procedures. Other methodological developments have focused on improving robustness in terms of inclusion of stakeholders and procedural justice which has contributed to the development of more participatory and deliberative methods (see 3.3.2.2). Given that both insufficient reliability of information and poorly described procedures for stakeholder involvement can hinder use of valuation in decision-making, efforts are needed to develop methods and best practices for improving both dimensions of robustness simultaneously.

3.3.2.1 Reliability in valuation

It is relevant to know how reliable and valid the evidence produced by different valuation methods/approaches is. The stronger the evidence, the more useful it may be for informing decision-making. The evaluation here recognised that different reliability and validity criteria exist for different types of methods and approaches and that they differ across disciplines.

This topic has three criteria in the assessment: reliability and internal and external validity (Bishop & Boyle, 2017; Drost, 2011; Golafshani, 2003). Given the limited available testing in valuation applications of reliability and validity (Lautenbach *et al.*, 2015; Rakotonarivo *et al.*, 2016), the evaluation asks whether applications assessed different forms/tests of reliability and validity, but not whether the results are deemed reliable or valid.

- **Reliability** (sometimes called dependability in qualitative studies) refers to the quality of valuation measurements (Franklin et al., 2010; Rakotonarivo et al., 2016; Schwandt et al., 2007). This is often evaluated by the consistency of measures and degree to which a valuation method/instrument provides similar outcomes each time it is used under the same conditions with the same respondents/participants. Three forms of reliability were included in the evaluation: replicability, consistency and precision. *Replicability* or repeatability of results can be established through test-retest studies, and inter-rater or inter-observer reliability. Replicability was reported in 11% of the reviewed valuations. *Consistency* is about showing that the valuation findings are maintaining an accepted standard over time, space, or groups. Consistency was reported in 7% of the reviewed valuations. *Precision* is a measure of variation among observations. Examples of indicators of precision include how scatter are results, heterogeneity, spread,

variance, and standard deviations/errors (accuracy is considered a different concept than precision). Precision was reported in 46% of the reviewed valuations.

- **Validity** is about the extent to which a valuation method accurately measures what it is supposed to measure and performs as it is designed to perform (Rakotonarivo et al., 2016). This can be split into internal and external validity. **Internal validity** refers to the validity of causal implications of a valuation study. Sub-criteria used for internal validity include credibility, construct validity, content validity, criterion validity, and community validity. *Credibility* (as a validity test for qualitative studies) is about the confidence in the "'truth" of the findings and can be established in different ways such as by triangulation, prolonged engagement, or member checks (test whether results are discussed with the study participants). *Construct validity* (also called theoretical validity) refers to the degree to which a valuation method/approach assesses/measures what it intends to measure according to (theoretical) constructs or concepts on which those methods are based. For example, willingness-to-pay measures are theoretically expected to vary with income. *Content validity* refers to the degree to which the method is designed to measure what it is supposed to measure when it performs well. For example, do respondents understand the questions that the researcher wants to ask so that they can provide meaningful answers? *Criterion validity* (for quantitative studies) is the comparison of measurements or observations against a *true* measure. For example, how do stated preferences from hypothetical markets compare to preferences in real markets (hypothetical bias), or how do the results of a hydrological model compare to measurements done on the ground (for example of water flows volume). Accuracy is a validity indicator and is about measuring what the method is aiming to measure (the *true value*), and some studies do an accuracy assessment. Finally, *community validity* (which is especially relevant in IPLC contexts) is used when the outcomes of a valuation approach are regarded as acceptable evidence if the findings are adequately shared and approved by the subjects of the valuation exercise. Information on internal validity was reported in 48% of the reviewed valuations.

- **External validity** refers to the ability to generalise the results of the valuation application to other settings. This is assessed according to two sub-criteria: transferability and generalisability. *Transferability,* here defined in a way applicable to qualitative studies, is assessed when an application shows that the findings have applicability in other contexts or settings, i.e., other times, settings, situations, and people. *Generalisability*, more used in quantitative studies, refers to the extent to which the results can be generalised from a sample to a population. Information on external validity was reported in 19% of the reviewed valuations.

Reliability in IPLC valuation

The "belief system" or worldview of the evaluator determines what they consider as robust methods and robust results and this varies across valuation purposes. For example, the robustness of ILK and IPLC methods and practices is often questioned and undervalued outside the IPLC contexts, unless the results match those of scholarly or academic valuation methods (Casimirri, 2003; Chilisa, 2020; Smith, 2012). Concepts of *what is evidence* (or what counts as truth) vary across disciplines, across actors, across cultures and belief systems **(Box 3.5)**. In the review, the criteria for reliability in IPLC contexts, has complemented the reliability criteria outlined above. These include whether valuation experts have the skills (training) and experience (age and practice) to undertake valuation correctly to produce reliable information, whether they are familiar with the teachings and traditions of the community, and whether they are trustworthy individuals (character and reputation).

For valuation to be useful and trustworthy to those who rely on the information that it generates and the conclusions that it draws, IPLC subject the valuators and the valuation process to different reliability criteria. These criteria safeguard the robustness, relevance and reliability of valuation. A total of 169 excerpts contributed to characterising the validation process and standards of valuation[28]. From these, the following could be discerned:

- Only information that comes from a validated and trusted source is useful.
- Heritage is an important determinant of legitimacy to undertake valuation.
- Time spent in the community and years of experience (age) are key factors that are considered.
- Inheritance and background can endow some members specific sets of abilities that allow them to access or retrieve certain types of knowledge, such as that of seers and healers who can serve as intermediaries between humans and non-humans
- Information coming from leaders is also trusted. Legitimate leaders usually fulfil many of the other criteria of trust: heritage, inheritance, skills, and age; and

28. Analysis of contributions on values and valuation methods by ILK experts and holders (https://doi.org/10.5281/zenodo.4404612).

- The character and reputation of those entrusted with validation is also a key factor.

Importantly, the evidence acquired from valuation is usually subjected to discussions and deliberations with the collective or among different members of the community before it is used to inform decisions (e.g., *'Valuation of nature is undertaken based on observation of resources followed by a decision agreed by chief and his people. The valuation exercise involved the chiefs, community leaders and land-owning groups'* (Contribution 20)).

3.3.2.2 Reliability controversy in statement-based valuation

The reliability of results from stated preference valuation have been under scrutiny and many of the lessons learned from the debate related to this also provide valuable information on how to improve other statement-based valuation methods (e.g., Rakotonarivo *et al.*, 2016). The debate has mainly been related to the elicitation of non-use values (also often referred to as passive use values). These values refer to the values that people may assign to nature without any current or future planned use directly or indirectly. Simply knowing that e.g., some particular species exists may be of value to people. Such values have been termed existence value and their importance have been acknowledged for more than half a century (Krutilla, 1967; Weisbrod, 1964). Another non-use value component is motivated by the desire to preserve biodiversity for the sake of other people, either in current or future generations (Loomis, 1988).

It is broadly acknowledged that non-use values are likely to constitute a significant proportion of the values related to biodiversity conservation and protection of nature's contributions to people, e.g., (Hanley & Czajkowski, 2019; Johansson, 1992; Johnston *et al.*, 2003; Richardson & Loomis, 2009; Turner *et al.*, 2003). Hence, omitting non-use values from valuations to support policy decisions affecting nature and biodiversity underestimate the importance that people attribute to conservation action.

The use of stated preference methods has increased over the past 30 years, and they are now the most commonly used economics-informed environmental valuation methods (Hanley & Czajkowski, 2019). However, the methods have been subject to a lot of controversy, most of which revolves around the hypothetical nature of value elicitation. For instance, it has been shown that people often exaggerate their willingness to pay in hypothetical situations compared to what they are actually willing to pay in real situations (Harrison & Rutström, 2008; List & Gallet, 2001; Murphy *et al.*, 2005). This is referred to as "hypothetical bias". In the context of stated preference surveys, as well as in any other methodology relying on people's statements, people may deliberately overstate or understate their actual values, aiming to influence the decision-making process in their desired direction (Bennett & Blamey, 2001; Hanley & Barbier, 2009).

Another criticism of stated preferences methods, usually by economists, has been that the decision behaviour of individuals participating in statement preference studies is often found to diverge from the standard neoclassical economic theories underpinning consumer choice theory and welfare measurement. However, more recent developments in behavioural and experimental economics have highlighted that models of economic decision-making can be improved to include a broader range of dispositional, social and cognitive factors (e.g., Dessart *et al.*, 2019). Particularly in relation to biodiversity, individuals may state high values due to moral or ethical beliefs, for instance, because it makes them feel good to signal a high value, or because they find it ethically unacceptable to trade-off biodiversity for money (e.g., Blamey *et al.*, 1999; Johansson-Stenman & Svedsäter, 2012; Kahneman & Knetsch, 1992; Nunes & Schokkaert, 2003). While the former would reflect strategic answers (since they do not actually expect to pay), the latter can be considered as a form of protest towards ascribing economic values to biodiversity. Also, it is often found that participants in stated preference surveys are apparently willing to pay some specific amount for nature protection initiatives, regardless of how much additional nature protection they are actually evaluating (e.g., Diamond & Hausman, 1994; Kahneman & Knetsch, 1992; Ojea & Loureiro, 2011). While these different types of "anomalous decision behaviour" are often highlighted in the criticism of the stated preference methods, and some economists argue that the values estimated are consequently unsuited for economic analysis (e.g., Hausman, 2012; McFadden & Train, 2017), it is worth noting that such behaviour actually also sometimes occurs in real life situations (e.g., Czajkowski *et al.*, 2017; Poe, 2016; Smith & Moore, 2010). Hence, it is not a behavioural phenomenon pertaining only to hypothetical valuation processes. Furthermore, some types of personal moral sentiments, for instance, relating to self-image and social conformity, may actually be consistent with economic theory and thus valid drivers of non-use values elicited through stated preference methods (Kotchen & Reiling, 2000; OECD, 2018).

As a result of the controversy, a large research effort has focused on developing and testing valuation measures and procedures to minimise hypothetical bias and other behavioural anomalies, aiming to increase the validity of the value estimates obtained, and make them suited for economic prioritisation (Hanley & Czajkowski, 2019; Kling *et al.*, 2012). Based on inputs from a wide range of experts in the field, current best practice guidance and advice for conducting stated preference studies is widely and freely available. Of key importance is careful survey construction with a particular focus on ensuring that value eliciting survey

questions as far as possible are incentive compatible to survey respondents. This entails that respondents have incentives to answer questions in line with their actual values. Specifically, stated preference surveys should fulfil three aspects: 1) the described changes are realistic, 2) their answers will influence the decision-making process, and 3) they will have to contribute the amount they have stated (or approved) if the policy is implemented. Stated preference surveys that as far as possible meet these state-of-the-art standards have been shown to significantly reduce the risk of hypothetical bias, strategic behaviour and other types of seemingly anomalous decision behaviour, and, thus, provide value estimates that are more reliable for policy support (Carson *et al.*, 2001; Carson & Groves, 2007; Hanley & Czajkowski, 2019; Johnston *et al.*, 2017; Vossler *et al.*, 2012).

Despite advances made for the stated preference methods, there is still disagreement in the scientific community concerning the usefulness of these methods for measuring environmental non-use values (and also use values). Many critics maintain that hypothetical bias and seemingly anomalous respondent behaviour inherently make biodiversity value estimates obtained with stated preference methods invalid and useless (e.g., Hausman, 2012; McFadden & Train, 2017) even if the methods are considered valid in other policy fields. On the other side, proponents of the methods argue that the methodological developments have addressed the most severe points of criticism. Proponents thus argue that non-use value estimates obtained through careful implementation of stated preference surveys in line with current best practice guidance will in most cases provide valid inputs on the welfare economic impacts of relevance for policy guidance and natural resource damage assessments (e.g., Carson, 2012; Hanley & Czajkowski, 2019; Kling *et al.*, 2012). Since no other methods can assess welfare economic non-use values, the proponents generally consider that it is better to use the stated preference methods and accept that there is some uncertainty associated with the obtained value estimates. The alternative is to risk that non-use values from nature and biodiversity are left out of the economic analyses routinely conducted in multiple policy contexts and consequently potentially neglected in decision-making processes.

Overall, the literature suggests that in decision contexts where non-use values are clearly non-negligible and important for policymaking, and where economic analysis will in any case be used to support decision-makers, carefully conducted stated preference studies can provide useful additional information about non-use values of nature and biodiversity.

The review finds that other statement-based methods have not been tested systematically to the same extent. Evidence from reviews about the reliability and validity of these methods is more abundant for some methods than for others. For example, regarding reliability and validity multiple reviews are available of monetary stated preference methods such as willingness to pay (Oerlemans *et al.*, 2016), willingness to accept (Whittington *et al.*, 2017), choice experiments (Rakotonarivo *et al.*, 2016), contingent valuation (Venkatachalam, 2004), and studies regarding the reliability in risk assessment (Hertwig *et al.*, 2019; Pasman & Rogers, 2018, 2020; Rogers *et al.*, 2019). However, our literature search provided limited evidence for other methods, especially those whose application in the context of valuation of biodiversity and nature's contributions to people is more recent. For example, one problem with ranking according to the importance of nature's contributions to people is that participants may rate all nature's contributions to people as very important. Such rankings do not help to inform trade-offs for decisions where not all nature's contributions to people can be provided at the same time and in all policy options (Horne *et al.*, 2005). The use of rankings is therefore not robust for decisive decision-making purposes. In general, the degree of reliability needed (and its associated trade-offs with the research cost and effort), is dependent on the decision context (Olander *et al.*, 2017). Thus, soundly grounding the ecosystem services/nature's contributions to people science into former research from ecological and environmental economics, together with an assessment of the degree of reliability needed by decision-makers, could help mitigating these challenges. Overall, the reliability and validity of more structured methods rely heavily on well-created study designs, including the accuracy of the description of the issue at stake and on individuals being sufficiently informed to provide robust answers (Ruiz-Frau *et al.*, 2018).

3.3.2.3 Fair representation

Fair representation relates both to whose values are included in a valuation process but also how the impact on different people or groups counts when a project or policy is evaluated. The first relates to how representation of values are ensured, the second which principles are used to judge whether a policy decision is favourable or not. While the two considerations are overlapping in practice, we present the findings of the assessment in two parts to help distinguish the different methodological aspects of ensuring fair representation in valuation.

3.3.2.3.1 Representation

Representation is relevant to understand whose values are being assessed. Representation was evaluated using two elements in the systematic review: the degree of representation (i.e., whether the different stakeholder groups that were identified and targeted as study respondents/participants were represented in the sample), and the characteristics by which stakeholder groups were identified

and distinguished (who is included in the valuation process?) (Fish *et al.*, 2011). This latter point, which concerns the sampling strategy, included for example gender, political roles, rights, power and interests/stakes. 43% of the reviewed valuation studies represent a diversity of stakeholder perspectives based on aspects such as age, gender, stakes and power relations (see also **Figure 3.38**).

For *inclusiveness*, it was evaluated *how* the application's process enabled participants to get involved (to ensure "participatory parity"). For example, providing extra time or adjusting language can help to overcome different barriers to participation and enable all participants to get involved as equals (**Figures 3.38** and **3.39**). For instance, 6% of the valuations report they engaged with participants in their local languages, or communicated through diverse media (e.g., verbal and written forms) (3%), or managed group composition and size (1%). For participatory approaches with group processes, the analysis of *power dynamics* in applications was registered in the systematic review following Bryson *et al.* (2013). To evaluate the quality and consequentiality of participation, the *level of participation* was evaluated by asking whether participants could influence the design, process and outcomes of the valuation and participate meaningfully (or whether the study only engaged respondents as data providers) (Udofia *et al.*, 2017). Finally, to evaluate the *transparency* of the process, it was assessed whether applications provide sufficient information about the valuation process and outcomes to different audiences, for example through sharing details about the methods, meetings, etc. (Bryson *et al.*, 2013) **(Figure 3.40)**.

The final aspect of fair representation evaluated was the *community of justice*: who/what is (implicitly) considered relevant and valuable in the application (Sikor *et al.*, 2014). For example, different groups, ranging from (part of) the current human population, to future or past generations, animals, and more-than-human or non-human beings, mother earth, etc may be considered relevant for the valuation.

Almost all studies have at least basic transparency, but only a minority fully shares methods and protocols **(Figure 3.40)**. The systematic literature review found that valuation studies have largely been focused on generating information about values at local to regional level (see 3.2) **(Figure 3.10)** and that almost half of the valuations are unclear about whose values are being represented in the study **(Figure 3.41)**. Among those studies that do make explicit whose values are considered, the values of specific groups within current

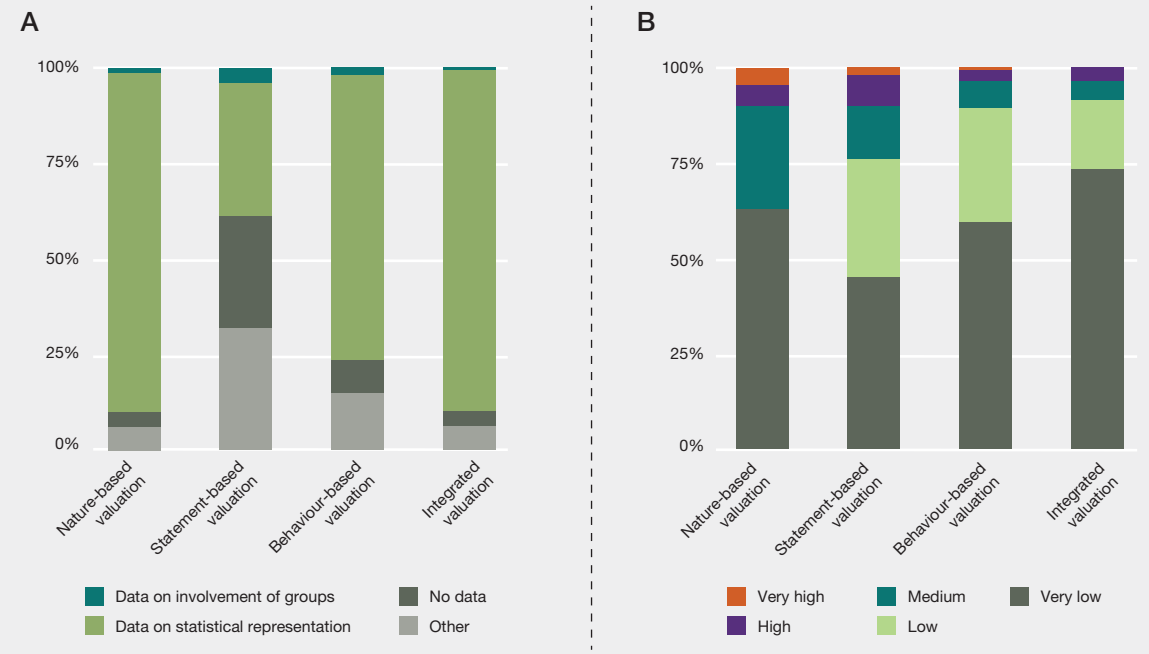


Figure 3 38 **Consideration of the representation in valuation: (A) Studies including information on different types of stakeholders/groups in society the valuation divided according to method families; (B) the extent to which people are distinguished, for the studies that do include information on participants.**

The distinctions include political, socio economic and cultural indicators (very low (one of fewer indicators) to very high (more than 8 indicators)). (n=1163).

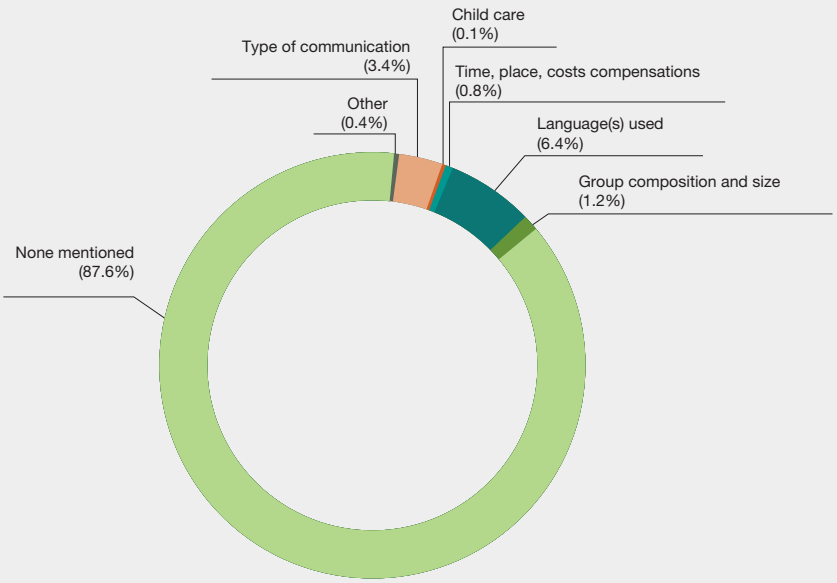


Figure 3 39 **Approaches for improving inclusion in valuation.**

Most valuation studies do not report on whether efforts were made to expand inclusion. The most common approach to include more stakeholders is to conduct valuation processes in local languages and to communicate information about the valuation process in ways that can ensure that it is correctly delivered to relevant stakeholders (e.g., accompanying invitation letters with verbal communication, using local media and communication channels).

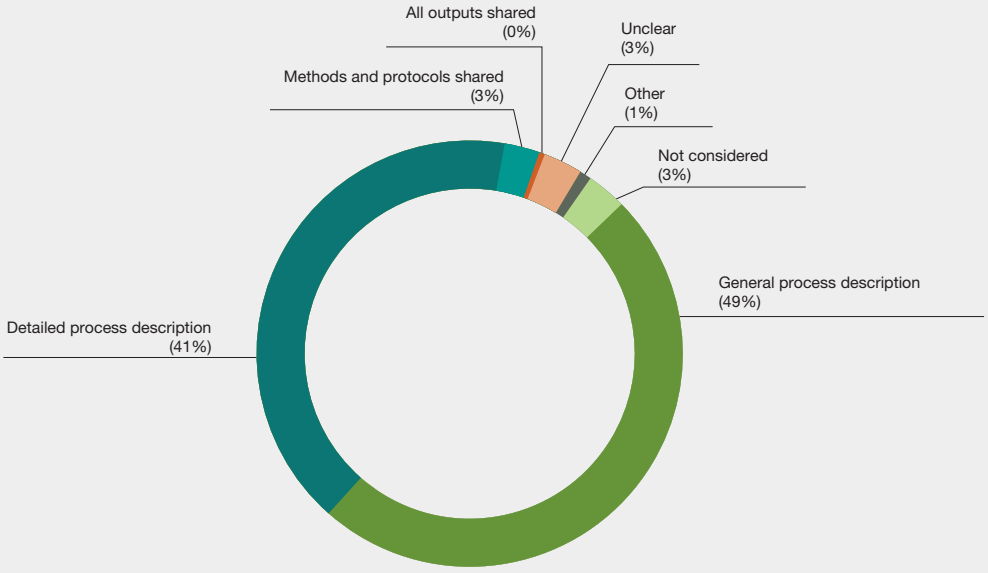


Figure 3 40 **Consideration of transparency in valuation.**

Most valuation studies -provide a process description, while a minority shares detailed methods or outputs.

generations (i.e., people living on the planet at the time of the study) prevail (24%) followed by the values of all people occupying the Earth at the time of the study. Studies have rarely considered the values of future generations (those not yet born; 4%) and there is almost complete absence of works that considered the values of past generations (those who no longer occupy the Earth today except as memories, spirits and ancestors). A small proportion of studies considered the values of Mother Earth as a living and contemporary entity (6%) in line with worldviews that do not separate nature from humans. These differences across valuations of whose values are considered reflects other

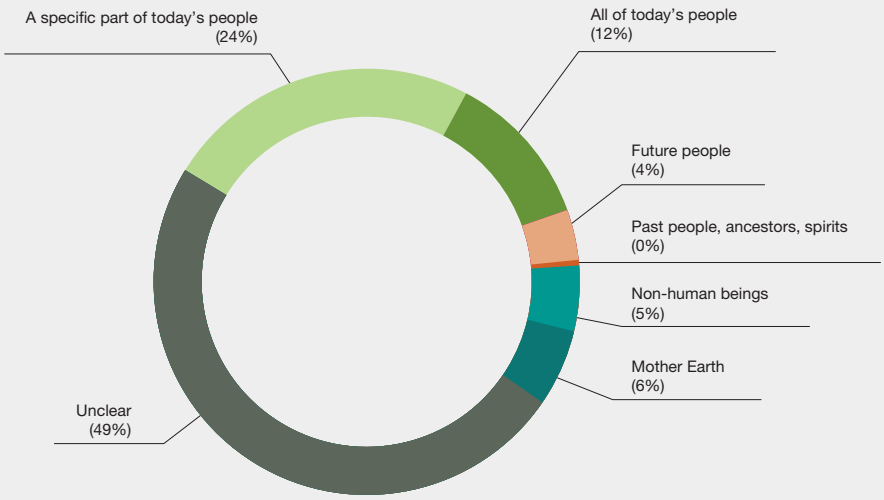


Figure 3 41 **Community of justice in valuation based on systematic review (n=1163).**

aspects of the valuation process, such as who is involved in the valuation processes (see 3.2.1.2 and 3.2.4.4) and who is considered a legitimate stakeholder in claims for justice in the community of justice (see 3.3) and less than one percent (0.6%) of studies mention power issues within the valuation process itself.

3.3.2.3.2 What is a good outcome for a community or society?

Nature valuation draws from different disciplinary traditions to gather methodologies that support the evaluation of community or society improvements as a result from the implementation of a project or a policy. The methodological challenges involved in robustly supporting judgements at a higher social scale than the individual has been debated at length in valuation (see 3.2.2.4).

An important methodological challenge relates to how (if possible) to compare the values and impacts on individual people. A fundamental challenge is that values and/or well-being are unobservable by the valuator and it is therefore impossible, in practice, to compare the impact on one specific person to the impact on another **(Box 3.6)**.

In practice, there are challenges both with the assumption of inter-personal comparability of utility or other well-being indicators and with the monetarization approach used in cost benefit analysis. The downside of not relying on the assumption of inter-personal comparability of utility in cost-benefit analysis is that once well-being is measured in monetary terms (willingness to pay or willingness to accept) the property of diminishing marginal utility of income disappears, and all dollar values are treated the same no matter to whom they accrue (Adler, 2016) (see Chapter 1).

This is potentially problematic since it ignores distributional issues in the summing up monetary values. The issue can be exacerbated by the fact that willingness to pay often increases with income (although this is not always true since marginal willingness to pay is typically measured), skewing what is seen as valuable by cost benefit analysis towards richer parties. Using a social welfare function (SWF) makes societal attitudes towards inequality explicit in the aggregating function. Evaluation using the social welfare function leads to interventions with a fairer distribution of policy impacts being preferred to alternatives with the same *overall impact distributed more unequally. This approach solves the omission of distributional preferences* but relies on the *arguably* problematic assumption of inter-personal comparability of utilities: all *utilities* are measured on the same cardinal (temperature-like) scale (Adler, 2016; Sen, 1970).

One solution to this issue in cost-benefit analysis is to deploy equity (distributional) weights when aggregating monetary values, and cost-benefit analysis guidelines in many countries recommend the practice. In practice, distributional weights adjust monetary values for diminishing marginal utility of income/money, thereby placing a higher weight on poorer households compared to richer. The United Kingdom Government Green Book Guidelines on cost-benefit analysis discusses these principles (HM Treasury, 2020), as do many other guidelines and textbooks on cost-benefit analysis (OECD, 2018). Despite this, such weights are rarely deployed in practice, for several reasons.

Practically speaking, using distributional weights in cost benefit analysis can change the appraisal and ranking of different interventions (Adler, 2016; Meya, 2020; Meya *et al.*, 2021) (see Chapter 1). When larger interventions are

Box 3 6 Inter-personal comparisons.

There is a long history of debate on making social choices, particularly on *inter*-personal comparisons of utility (Fleurbaey & Abi-Rafeh, 2016; Harsanyi, 1987; Sen, 1970). To illustrate the essential argument, consider measures of subjective well-being, where individuals express on a scale between 1 – 10 how satisfied they are with their lives. Suppose Ana reveals a score of 4 and Laila a score of 5. Does this mean that Ana is less satisfied than Laila? Suppose a year later Ana has a score of 5 and Laila has a score of 6. Does this mean that their satisfaction has increased by the same amount: 1 unit? It seems intuitive to say that satisfaction has increased for both parties (an intra-personal comparison), but societal value aggregation approaches also require inter-personal comparability to aggregate well-being and make comparisons between different options.

If the numbers above represented utility (rather than subjective well-being, which is technically different (OECD, 2018)), and we were using a social welfare function approach, this would mean that the answer to each question would be yes. Ana's well-being is lower than Laila's but increased by the same amount over time. While this is clearly an important underlying assumption, intuitively, we are often able to make interpersonal comparisons of well-being when we say that one person's well-being is clearly less than another's on the basis of differences in health or opportunities (Fleurbaey & Abi-Rafeh, 2016; Harsanyi, 1987; Sen, 1970).

Cost benefit analysis (see 3.2.2.4) takes a different approach to measuring changes in well-being, and valuation in general. First, individual changes in well-being are measured in monetary terms. Compensating or equivalent variations, reflecting Willingness to Pay (WTP) or Willingness to Accept (WTA), are calculated in principle at the individual level, reflecting the individual strength of preferences and the importance attached to changes in circumstances: e.g., ecological quality or nature's contributions to people. Once converted into monetary units, aggregation and comparisons are then possible in this common metric. No assumptions are made about the inter-personal comparability of utility, and the aggregation of impacts is then straightforward if substitutability between values of nature and monetary gains or losses are substitutable (OECD, 2018, Chapters 1-4). See Chapter 2 for further review of this assumption.

evaluated, such as the impact of climate change, the use of equity weights or social welfare functions that accommodate inequality aversion raise considerably the welfare valuation of damages from climate change (the Social Cost of Carbon), in part because climate effects are larger in poor countries and regions (e.g., Anthoff & Emmerling, 2019; Anthoff & Tol, 2010; Kornek *et al.*, 2021). The outcomes for appraisal when using distributional weights in cost-benefit analysis will vary from case to case, and in some cases can lead to worse outcomes for the poor (Boardman *et al.*, 2020).

Nevertheless, there are clearly defined approaches to dealing with distributional issues in cost-benefit analysis using distributional weights. Cost-benefit analysis with distributional weights is sometimes equivalent to defining a social welfare function (SWF). Such approaches can be used to account for distributional concerns for environmental (rather than monetary) outcomes too (Venmans & Groom, 2021). Alternative, pragmatic approaches to distributional issues that are more frequently deployed in public policy appraisal include making clear who are the winners and who are the losers in the constituency and making a value judgement on whether the distribution of benefits and costs is acceptable given the aggregate gains. Other alternatives include looking at the impact on essential items that determine well-being, and this has been offered as an alternative in World Bank guidance on cost-benefit analysis in developing countries (Harberger, 1984).

Finally, Arrow's impossibility theorem (Arrow, 1950) is an important result in the debate on how to define appropriate decision rules at higher social scales than the individual. It states that if individuals have different rankings of, say, environmental policies, there is no social welfare function that can represent these preferences which also satisfies transitivity (if a is preferred to b, and b preferred to c, then a is preferred to c) and a series of other desirable social choice axioms, such as non-dictatorship: social choice being determined by the ranking of one individual (Sen, 1998). Typically, relaxing axioms like Universal Domain (UD: that all policies can be ranked) or the Independence or Irrelevant Alternatives (IIA: that adding new policies cannot change the rank of other possibilities) are seen as a reasonable practical way forward. Cost-benefit analysis fails the Independence or Irrelevant Alternatives axiom for instance (Adler, 2016).

Aggregation of well-being over time is also a central issue in welfare economics. While remaining welfarist and consequential in general, inter-temporal social welfare functions can reflect principles of fairness and sustainability, in a similar way to intra-temporal social welfare functions. In an inter-temporal context, the specific social welfare function implies a particular social discount rate (SDR). A typical utilitarian inter-temporal social welfare function will sum up utilities for a *representative agent*: a single agent that is in some sense representative of the average household and reflects aggregate well-being, over time. Their utility will reflect diminishing marginal utility, and so an additional unit of consumption will be worth less to a rich person than a poor person and vice versa. If there is growth (decline) in incomes over time, agents in the future will be richer

(poorer) and hence an additional unit of consumption in the future will be *discounted* positively (negatively) compared to the poorer (richer) present agents (Drupp *et al.*, 2018). Discounting the future stems in part from the aversion to inequality and growth. The way in which the future is discounted from this welfare perspective will depend on the nature of the social welfare function. Emmerling *et al.* (2017) introduce intra-generation inequality, Dietz & Asheim (2012) introduce sustainability constraints, Gollier (2013) introduces uncertainty in future prospects, Sterner & Persson (2008) introduce environmental scarcity and Drupp (2018) introduces limited substitutability and strong sustainability. Each social welfare function affects the valuation placed on the future by the society, often raising the valuation compared to historical economic analysis. Since 2003, the United Kingdom government has used a declining discount rate due to uncertainty about the long-run future. France, Norway and Denmark do the same (Groom & Hepburn, 2017). The United States of America cost-benefit analysis guidelines recommend a lower rate for very long-run for similar reasons of uncertainty.

The value of the future environment today is a key area of research. Many studies have illustrated the implications for rising scarcity of environmental assets and the lower social discount rate that this can imply: Baumgärtner *et al.* (2015) for ecosystem services, Drupp & Hänsel (2020) and Sterner & Persson (2008) for climate change, and Venmans and Groom (2021) for forests and air quality. The valuation of the future environment will depend on preferences for the environment, substitutability of the environment for other consumption goods, and the uncertainties about future environmental quality.

Deliberative decision-making takes a very different approach to the question of how to make judgements at higher social scales than the individual level. A judgement should be based on a dialogue between equals and a judgement is rational if it is the result of a free exchange of arguments for or against a course of action (Habermas, 1996; O'Hara, 1996). This makes participation of stakeholders in the deliberative process essential for the legitimacy of the decision (Schaafsma *et al.* 2018) (see 3.3.2.2). Furthermore, participation as equals becomes a fundamental requirement for the suitability of this approach (see 3.3.2.3). In nature valuation, deliberative decision-making, as a process to generate collective decision-making has developed in response to perceived shortcoming of individual aggregation approaches. The critique has both been based on a critique of conceptualising society as a sum of individuals and a critique of monetization. The proponents have advocated for the need for democratic procedures to reach judgement on socially desirable actions rather than technical procedures involved in aggregation (Bartkowski & Lienhoop, 2019; Howarth & Wilson, 2006; Sagoff, 1988) (see Chapter 2).

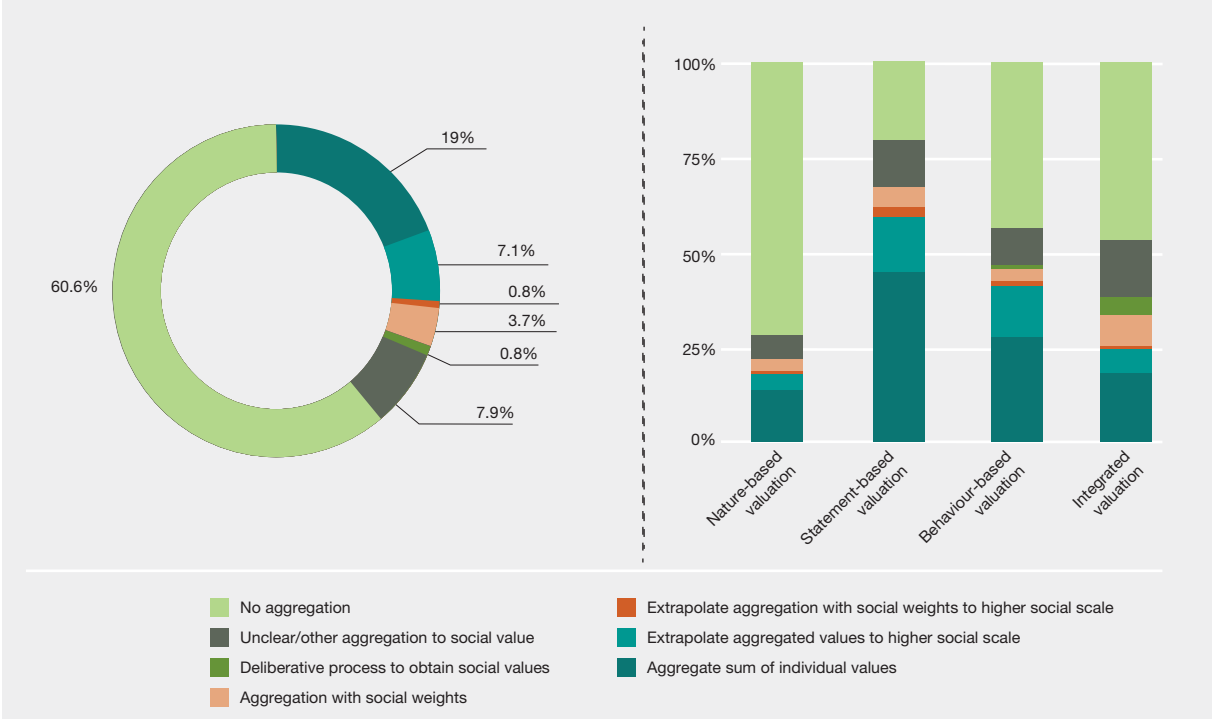


Figure 3 42 **Approaches to aggregate individually held values for the collective or a higher social scale to support decision-making (n=1163).**

The practice of valuation also reflects the theoretical debates on aggregation. The valuation result at the higher social scale can be achieved by aggregation of different stakeholders' values or aggregation of individually expressed values. Aggregation by simple sums, sometimes extrapolated to higher social scales, occurs most often. Sometimes, weights are applied to reflect the social judgement that the consequences for some people or areas are considered more important than others. **Figure 3.42** shows the findings from the systematic review. Group based development of values for a higher social scale in particular (see 3.2.2.2) places emphasis on equal opportunities to participate in the valuation and acknowledges that power asymmetry needs to be addressed. However, the systematic review found that less than one percent (0.6%) of studies mention power issues within the valuation process itself, and that only a small 5% applies social weights in aggregation.

The evidence shows that over half of valuation studies do not present the results of the valuation at higher social scales. Of the studies that do bring the values together to form a judgement, simple aggregation of values is the most common approach, followed by using weights. A minority of valuation develops social values using deliberation.

In conclusion, research on robustness of valuation processes has focused on different aspects of robustness, reflecting the intended use of the valuation outputs and the disciplinary perspectives of the valuator. The criteria for how to judge robustness are contested; some sources of evidence emphasise legitimacy and other sources emphasise theoretical consistency and accuracy. Robustness has mainly been formally evaluated using reliability criteria by synthesising evidence from multiple studies. As true values cannot be observed, and valuation informs decisions in different ways, reliability and validity guidance must be adapted to the valuation needs and the valuation methods chosen. In practical applications of valuation methods, limited attention has been given to formally assess robustness, both reliability and fair representation. Good practice guidelines exist for some approaches but are not generally available for a wide range of methods. Development of a wider range of practical guidelines sensitive to the valuation purpose has the potential to improve the robustness of valuation and decrease the risk of (mis)informing decisions and in turn produce perverse outcomes.

3.3.3 Resources for valuation

Methods and tools also vary in their feasibility for widespread use, resource (e.g., time and expertise) requirements, or degree of stakeholder involvement. Different types of resources are needed in terms of data, expertise required, time and budget to conduct valuation. These four aspects vary significantly within each group method and bear strong interdependencies, since choosing a method depends on the existing expertise and the available budget and time. In many contexts, it is only possible to rely on existing valuation outputs and use the outputs to attend the policy problem at hand. We therefore divide this section into two subsections; the first section outlining the evidence on resource needs for use of valuation methods; the second section giving a review of existing approaches to make use of existing valuation outputs in a new policy section.

3.3.3.1 Resource needs for methods applications

Different valuation methods vary with respect to the type of data used to generate value information and the resource barriers can therefore be characterised using the method family classification. For all families we divide resource needs in terms of technical skills, existing data sources, network and stakeholder trust, time and financial resources. Overall, the assessment found limited comprehensive sources to assess resource needs for valuation. The section is based on the evidence generated from the review of methods (see 3.2.2).

Nature-based valuation

Data resources for nature-based valuation could be classified as biotic or abiotic. Biotic data would entail all information related to species, ecosystems and ecological processes (Tashie & Ringold, 2019). Abiotic data would refer to all data on geophysical processes that influence biota (e.g., hydrodynamics), but also abiotic parameters like, e.g., wave energy or geomorphology. Such data can be obtained through different sources ranging from collected field data, to data collected through Earth observation (e.g., remote sensing, unmanned aerial vehicles; Tashie & Ringold, 2019), data inferred through modelling processes, and data extracted from large global databases.

The *expertise* required to collect data, quantify and map or model biodiversity and ecosystem services with nature-based methods, spans across a multitude of disciplines. Within the ecosystem services body of literature, Droste *et al.* (2018) identified that upon the beginning of the concept, assessments were mono-disciplinary. Yet as the concept evolved and the topics became more complex, the assessments required inter- and multi-disciplinary expertise. Expertise required for nature-based valuation ranges from: i) topic expertise required for field data collection; ii) modelling expertise; iii) geo-informatics expertise for mapping and modelling; to iv) social science expertise for participatory approaches used to engage with resource users. Palomo *et al.* (2018) identified the lack of relevant expertise as one of the major bottlenecks in ecosystem services mapping.

Time and cost of the different methods also vary significantly with the method. While time and cost are generally correlated (i.e., the longer it takes to undertake a study, the more it costs), it is not always the case. Direct measurements and participatory approaches are more suitable for assessments of smaller extent, but require time to cover larger areas (Brown & Kyttä, 2018), yet the cost is relatively low. Mapping and modelling are rapid methods for areas of larger extent but require time for learning the method and the software. According to Bagstad *et al.* (2013), decision-makers feel that running quantitative models takes too much time and costs too much in comparison to the depth and quality of information added to the decision-making process. Depending on the topic under investigation, the cost could range from low (when the assessment uses open data), to very high (mainly when dealing with very high resolution (VHR) Earth observation products).

Statement-based valuation

As the valuation is usually based on questionnaires, interviews or group discussions, statement-based valuation often has limited requirements for existing *data sources.* It is also this characteristic that makes the methods highly adaptable to new contexts where valuation has not been conducted previously. The main costs relate to the development of the elicitation format and the implementation of the data collection. When participatory approaches are conducted, projects often need to pay the opportunity costs borne by local stakeholders (Evans, 2018). This can be a significant cost when valuations seek to engage with many participants.

The *expertise* varies from statistical data collection design skills to facilitation skills, and often both sets of skills are needed to conduct a full valuation process (see 3.2.2).

Time and costs required for data collection often face additional constraints related to participants availability. The valuator needs to adapt data collection to suit the participants, and for group-based processes the organizational challenges to bring together the relevant stakeholders requires careful planning over a longer timeframe (see 3.2.2.2).

Behaviour-Based valuation

Availability *of data sources* to conduct behaviour-based valuation is often a barrier to apply methods in this family. Both data to characterise aspects of nature, such as the spatial distribution of available resources, and data on people's activities can be very costly to obtain. In recent years more applications have utilised remotely sourced data, e.g., using Global Positioning System (see 3.2.2) but where such options are not available or not suitable for the valuation, low-cost options collecting data from resource users through questionnaires and interviews, continue to be a useful approach (see 3.2.2). Behaviour-based approaches therefore vary in their requirement for existing data sources. Cost-based methods are generally seen as a low-cost option for behaviour- based valuation (see 3.2.2.3).

The *expertise* varies between highly technical expertise required to conduct e.g., hedonic pricing methods (see 3.2.2.3) to qualitative data collection approaches using participant observations (see 3.2.2.3).

Time and costs generally result from the amount of prior investment in existing data collection infrastructure and modelling expertise. Given the high quality of core data sets on biophysical resources and socio demographic characteristics, behaviour-based valuation can be relatively inexpensive, however developing the infrastructure is often a large investment (Lupi *et al.*, 2020).

Integrated valuation

As integrated valuation brings together diverse approaches to synthesise diverse valuation information, the resources requirements also reflect this diversity. Some approaches are highly technical (such as integrated modelling, see 3.2.2.4) and thus the resource requirements resample some of the valuation approaches in nature-based valuation or behaviour-based valuation relying on existing data and model infrastructure. Other methods (such as deliberative decision-making approaches, see 3.2.2.4) have resource requirements that resemble statement-based approaches.

See further information on resource requirements on selected methods for which sufficient information exists to evaluate limitations for use in resource limited contexts in Section 3.4.

3.3.3.2 Using pre-existing valuation outputs: benefit transfer

Benefit transfer is the use of pre-existing empirical estimates from one or more sites or contexts where research has been conducted previously to predict measures of economic value for other, typically unstudied sites or contexts. Transfers can occur over different locations, times, populations, policies, or other dimensions. The primary feature that distinguishes benefit transfer from other types of economic valuation is that values are quantified through the use of "existing data or information in settings other than for what it was originally collected" (Rosenberger & Loomis, 2003, p. 445). Virtually any type of economic value information can be transferred. Common examples involve transfers of welfare estimates from recreation demand models, hedonic property value models, stated preference studies (choice experiments and contingent valuation) and other types of non-market valuation, representing values for changes in many different types of environmental goods and services (Johnston *et al.*, 2018).

Benefit transfer is only one of many procedures that extrapolate existing biophysical or socio-economic information to predict outcomes in new situations. However, environmental benefit transfer has been described as one of the most difficult types of information transfer, due to factors such as the provision of environmental goods and services outside of organised markets, common lack of consistency in the biophysical measures used to quantify these non-market goods and services in original valuation studies, and the fact that economic welfare measures cannot be observed directly (Boyd *et al.*, 2016; Boyle *et al.*, 2010). As a result, environmental benefit transfer has faced greater scrutiny than other types of information transfer, with an extensive literature devoted to topics such as validity and reliability (Boyle *et al.*, 2010; Rosenberger, 2015).

Reviews of benefit transfer theory, methods and practice are provided by Boyle *et al.* (2010), Johnston and Rosenberger (2010) and Johnston *et al.* (2018), among others. As discussed by this literature, the accuracy of benefit transfer depends on the underlying accuracy of the original study or studies that provide the information to be transferred, along with the generalisation error caused by the extrapolation of that information to new settings (Boyle *et al.*, 2010; Rosenberger & Stanley, 2006). Accordingly, benefit transfer accuracy depends on the capacity of transfer procedures to calibrate transferred value information to new setting(s). Corresponding to this expectation, past reviews find that benefit-function transfers tend to be more accurate than simpler unit-value transfers on average, although there are exceptions to this general finding (Johnston *et al.*, 2018; Rosenberger, 2015). The use of data-synthesis approaches such as meta-analysis may also improve accuracy (Kaul *et al.*, 2013). Yet although there is increasing consensus over best practices that are expected to enhance the validity and reliability of benefit transfers on average, it is still difficult to predict how individual methods will perform within specific applications (Johnston *et al.*, 2018, p. 222).

Discussions on the need for, and role of benefit transfer within decision-making are provided by sources such as Boyle *et al.* (2010), Brouwer and Navrud (2015), Griffiths *et al.* (2012), Griffiths and Wheeler (2005), Iovanna and Griffiths (2006), Johnston *et al.* (2015, 2018); Johnston and Rosenberger (2010), Loomis (2015), Rolfe *et al.* (2015) and Wheeler (2015). In principle, decisions on whether to use original valuation studies or benefit transfers to inform decisions should depend on the value of information (VOI) provided by these alternative value-estimation approaches compared to the associated cost of information. Value of information is determined by the expected increase in the net social value of policy or program decisions made possible by the provided value information, as influenced by factors such as the magnitude of benefits and costs that depend on the decisions to be made, the relative accuracy of each prospective study type, and the potential influence of value information on the decisions (Newbold & Johnston, 2020). Limited research in this area suggests that the cost of original valuation studies is usually justified for major environmental decisions (eg., Allen & Loomis, 2008; Barton, 2007; Navrud & Pruckner, 1997; Newbold & Johnston, 2020).

In practice, however, benefit transfer is often indispensable, because practical constraints preclude the use of original studies to provide the information required for policy or program analysis (Newbold *et al.*, 2018). Within the context of United States federal policy analysis, for example, Newbold *et al.* (2018, p. 469) argues that, *'it is impossible to conduct a prospective [benefit–cost analysis] without the use of at least some form of benefit (and cost) transfers'.* This tension is discussed by Johnston *et al.* (2018, p. 179), who acknowledge that benefit transfer *'is rarely a preferred valuation method but is arguably the most common valuation method within large-scale benefit–cost analysis'.*

The uptake of benefit transfer to inform policy and program decisions is well documented in developed-country contexts, including the United States, European Union and Canada. A historical perspective on United States uptake is provided by Loomis (2015, p. 61), who notes that *'U.S. federal and state agencies have used benefit transfers, in one form or another, for decades'.* The use of benefit transfer as part of United States Environmental Protection Agency (US EPA) regulatory impact analyses is well documented (Griffiths *et al.*, 2012; Griffiths & Wheeler, 2005; Iovanna & Griffiths, 2006; Newbold *et al.*, 2018; Wheeler, 2015), and benefit transfer has been recognized within the agency's guidelines for economic analysis for over two decades (US EPA, 2000, 2010). Methods used for these applications have evolved from simple unit-value transfers in the 1980s and 1990s to more recent applications of more sophisticated benefit-function and meta-analytic transfers (Wheeler, 2015). Other United States examples include applications to policy, program and planning analyses within the United States Department of Agriculture (e.g., USDA NRCS, 2010), United States Department of Commerce (e.g., Samonte *et al.*, 2017), United States Forest Service (e.g., Rosenberger & Loomis, 2001), and others (Loomis, 2015). Benefit transfers have also been used to support liability payments for court cases (Boyle *et al.*, 2010; Loomis, 2015). As in the United States, official guidance for cost-benefit analysis in Canada recognizes benefit transfer as an allowable practice (Treasury Board of Canada Secretariat, 2007), and reports utilising benefit transfer have been used to inform government actions (Dupont & Renzetti, 2008).

Brouwer and Navrud (2015) review applications of benefit-transfer in Europe, with multiple examples of cases in which benefit transfer has been used to inform environmental policies and programs. These include the External Costs of Energy (ExternE) project supported by the European Commission (European Commission Directorate, 2005). The

European Water Framework Directive (WFD) (approved in 2000) requires river basin management plans to consider measures of benefits and costs and has thereby promoted applications of benefit transfers to quantify these measures (Rosenberger & Loomis, 2003). Brouwer and Navrud (2015) describe a set of benefit transfers linked to the WFD. An example at the national level is United Kingdom National Ecosystem Assessment (UK NEA, 2011), which applied multiple benefit transfer approaches to estimate ecosystem service values (Bateman *et al.*, 2011; Brouwer & Navrud, 2015).

Compared to the United States and Europe, reviews of benefit-transfer applications report fewer examples of uptake related to policy and program decisions in other regions of the world. A summary of benefit transfer applications in Australia and New Zealand is provided by Rolfe *et al.* (2015). In principle, valuations of economic benefits or costs via benefit transfer can occur in these countries under multiple types of governmental policy and program analyses, including Regulatory Impact Statements and Environmental Impact Assessments. However, the use of benefit transfer (or more generally non-market valuation) within these analyses is uncommon (Rolfe *et al.*, 2015).

Within developing countries, benefit transfers have been implemented by and for intergovernmental organisations, and are documented in a diversity of technical reports, project appraisals and other publications. For example, an OECD report calculates Value of Statistical Life (VSL) estimates for countries such as China and India using benefit transfer (Brouwer & Navrud, 2015; OECD, 2014). Dixon (2012) reports on the use of benefit transfers to estimate the benefits of waste-water treatment in Guyana, Trinidad and Tobago, Paraguay and Uruguay, as part of a discussion paper for the Inter-American Development Bank. A technical report prepared for the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD) applies benefit transfer to illustrate values linked to reducing emissions from deforestation and forest degradation in Panama (Narloch, 2014). Similar transfers have been conducted by international non-governmental organisations (e.g., Bello *et al.*, 2014 in Colombia).

Developing-country transfers are frequently conducted to raise awareness of economic values or to provide general background information for policy development. There are also examples of benefit transfer within formal policy and program evaluations. Silva and Pagiola (2003), for example, review the valuation conducted for World Bank project evaluations and report multiple applications of benefit transfer. Individual World Bank project appraisal documents also apply to benefit transfer methods (eg., World Bank, 2009, 2017). An illustration of ex-post program assessment is provided by Maradan's (2017) report to the United Nations Development Programme – United Nations Environmental Programme (UNDP-UNEP) Poverty-Environment Initiative in Rwanda, which applies benefit transfer techniques to evaluate benefits from a green village demonstration. In contrast to some developed countries (and particularly the United States), it is difficult to find documentation of cases in which benefit transfer has been applied by individual government agencies within developing countries. Either such applications do not exist, or they have been conducted in ways that are not documented for external searches.

Benefit transfer techniques have also been adopted within worldwide, intergovernmental valuation and accounting initiatives. For example, benefit transfer techniques are recognized in the draft ecosystem accounting framework of the System of Environmental-Economic Accounting (SEEA), prepared under the auspices of the United Nations Committee of Experts on Environmental Accounting (UN, 2020). Within this context, benefit transfer methods provide a way to generalise values to a national accounting area adjusting for spatial variation in ecosystem services and recording reliability. Another example is found in the Economics of Ecosystems and Biodiversity (TEEB) Valuation Database Manual (McVittie & Hussain, 2013), which contains over two hundred examples of values estimated using benefit transfer. The Economics of Ecosystems and Biodiversity (TEEB) training package for national implementers and practitioners further recognizes benefit transfer as an applicable valuation tool.

As observed within prior reviews of research and practice, there is a common divergence between the flexible and sophisticated procedures commonly recommended in the academic literature and those applied by practitioners. This gap appears to be larger and more common for developing-country applications. As illustrated by many of the sources discussed above, applications in the United States and Europe are increasingly moving towards meta-analysis and other more sophisticated procedures. However, developing-country applications often rely on unit-value and other simpler approaches that tend to be less accurate. Addressing this divergence between research and practice has long been recognized as a challenge (Johnston *et al.*, 2018; Johnston & Rosenberger, 2010).

3.3.4 Trade-offs between relevance, robustness and resources in method choice

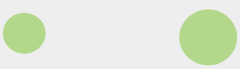
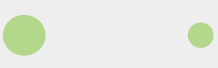
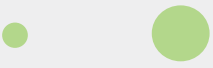
Sections 3.3.1-3.3.3 have outlined key considerations for valuation choices on *relevance* (see 3.3.1), *robustness* (see 3.3.2) and *resources* (see 3.3.3). It is rarely possible to conduct valuation to support decision-making processes that simultaneously i) provides all relevant information from all relevant stakeholders, ii) brings forward robust

information on all important aspects of the alternative options, while iii) doing so using very few resources. Any choice of valuation process and methods therefore entails trade-offs. In the following, we refer to the three dimensions of valuation (*relevance, robustness* and *resources*) as the 3Rs for simplicity. We synthesise the relative strength of individual methods, reviewed in Section 3.2.2, with respect to the 3Rs. This entails assessing their capacity to provide information on different types of values in a wide range of socio-ecological contexts, the robustness of the value information for different decision-making purposes, and the need for existing data sources and time and financial resources to obtain the valuation results. For the assessment, we select well established valuation methods across the four method families, for which sufficient information has been obtained from the reviews. Each of the 3R dimensions needs to be assessed given the policy purpose. This is perhaps self-evident, but still worth emphasising as this dependence makes it challenging to provide overall principles for a choice of valuation methods. Which values are relevant to assess depends on what the valuation will be used for, and how robust the valuation needs to be, both with respect to reliability and fair representation is also determined by the purpose of the valuation. Finally, the resources that should be spent on valuation is not just based on availability but also on whether the information is worth it in relation to the prospects of the decision alternatives (see 3.3.1.3). The decision-making purpose is therefore a condition for evaluating the suitability of a method with respect to each of the 3Rs. For each method, we outline what characterises the performance of the methods on each of the three criteria and how performance can be improved. For example, relevance has two performance measures –the capacity to elicit diverse values in diverse socio-ecological contexts, which are separately assessed in terms of the strength of evidence for each method. For each method, we illustrate the three dimensions for a specific policy purpose as an example. Further material on the choice of methods within a valuation process is presented in Section 3.4.

The assessment of selected methods is summarised in **Table 3.10** based on the reviews and Section 3.2.2 and the systematic review of valuation (the methodology for evaluating the criteria is outlined in Annex 3.13). For more information about the individual methods please refer to Sections 3.2.2.1, 3.2.2.2, 3.2.2.3 and 3.2.2.4.

Table 3 10 **Comparing valuation across nature-based, statement-based, behaviour-based and integrated valuation using the 3R criteria (Relevance, Robustness and Resources).**

Strength of evidence is assessed to one of the following categories: Well-established (large bubble); Established but incomplete (small bubble). Methods with less available evidence have not been included in the assessment.

	RELEVANCE Diverse values and socio-ecological contexts		ROBUSTNESS Reliability and fair representation		RESOURCES Initial capacity and costs and time for valuation	
	Values	Contexts	Reliability	Fair representation	Capacity	Conducting valuation
Nature-based valuation						
Ecosystem service mapping	• Linking nature to nature's contributions to peoples • Instrumental Values • Applicable to all nature's contributions to peoples & applied across ecosystems & global contexts at different scales		• Reliability testing in terms of accuracy of the tools are emerging • Generally low representation of multiple stakeholders		• High initial resource requirements (geoinformatics and geospatial data) • Modest valuation costs when initial data and skills are available	
How to improve the 3Rs	• Improved understanding of who is impacted by changes in ecosystem services • Apply to alternative policy scenarios		• Improve availability of data globally • Validate using local data • Higher spatial resolution		• Capacity building and developing collaboration among data holders and modelers and ultimate users	
Strenght of the evidence						
Biodiversity priority mapping	• Ecological integrity • Intrinsic values • Multiple biomes and scales		• Reliability in terms of accuracy of the tools are emerging • Sensitive to the selected experts involved		• High initial resource requirements (geoinformatics and geospatial data) • High data needs	

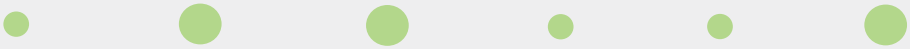
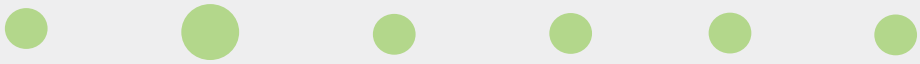
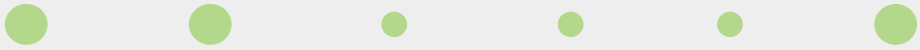
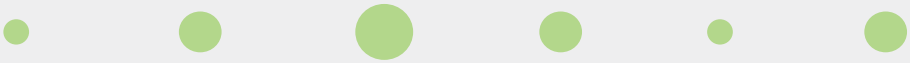
	RELEVANCE Diverse values and socio-ecological contexts		ROBUSTNESS Reliability and fair representation		RESOURCES Initial capacity and costs and time for valuation	
	Values	Contexts	Reliability	Fair representation	Capacity	Conducting valuation
How to improve the 3Rs	• Being more specific about the purpose would increase policy relevance		• Robustness can be improved through harmonization and model-based integration of multiple types of biodiversity and environmental data from heterogeneous sources		• Capacity building and developing collaboration among data holders and modelers and ultimate users	
Strenght of the evidence						
Statement-based Valuation						
Stated preference	• Instrumental values • Amenable to a wide range of economic values and understanding of social drivers of economic decisions • Highly versatile and adaptable to a large range of socio-ecological contexts		• Allow consistent comparisons of diverse values • Reliable for informative, decisive, and technical purposes given adherence to best practice • Can provide information on distributional effects		• Requires expert knowledge in designing the survey instrument • Practical guidance widely available • Valuation can be scaled in size to available budget	
How to improve the 3Rs	• Design of the valuation in dialogue with stakeholders and policy/ scientific experts can greatly improve the relevance.		• Adhere to best practice guidelines on design process in collaboration with stakeholders and users of the information		• Adhere to best practice guidelines for the design and data collection • Training required for reliable use	
Strenght of the evidence						
Q sorting	• Understanding diverse perspective on a policy question, but mainly for informative purposes • Can provide information on incompatible perspectives • Applicable to broad and specific values • Applied to a wide range of policy areas and socio-ecological contexts		• The samples are non-random implying limited generalizability of the findings and representativeness of key stakeholders		• Adapted to small group size, but requires considerable planning time and preparation time • Freely available software & does not rely on existing data	
How to improve the 3Rs	• Relatively new technique in valuation. Incorporating the method in the valuation design could improve the relevance		• More testing in valuation contexts would improve the robustness of the approach		• Development of best practice guidelines for use in valuation	
Strenght of the evidence						
Behaviour-based valuation						
Revealed preference	• Economic use values • Applicable to few types of values • Instrumental values		• Allow consistent inclusion of non-market values • Reliable when adhering to best practice guidelines • Representation often only partial for the community or society in general		• High initial data requirements • High level of statistical skills • Modest implementation costs	
How to improve the 3Rs	• Open access to a wider range of socio-demographic, economic and environmental data		• Clarity about the restricted range of values and the partial representation of potential stakeholders		• Capacity building and developing collaboration among data holders and modelers and ultimate users.	
Strenght of the evidence						
Livelihood assessment	• Relevant to a broad range of socio-economic contexts where people's livelihood is directly dependent on nature • Instrumental values		• Reliable for assessing households and communities' dependence on nature • Allow representative assessments of different social groups • Good practice guidelines available to conduct valuation		• Low requirements for initial data and technical infrastructure • Time demanding and reliance on investment in engaging stakeholders	
How to improve the 3Rs	• Designing assessments based on context specific understanding from local stakeholders about livelihood-nature dependency		• Involvement of local stakeholders in the design of the assessment		• Adherence of good practice guide and livelihood assessment tools would help to optimize the time and resource requirements	

Table 3 10

	RELEVANCE Diverse values and socio-ecological contexts		ROBUSTNESS Reliability and fair representation		RESOURCES Initial capacity and costs and time for valuation	
	Values	Contexts	Reliability	Fair representation	Capacity	Conducting valuation
Strenght of the evidence						
Integrated valuation						
Integrative method: **Integrated modelling**	• Linking nature and natural processes to well-being indicators • Often few very specific value indicators • Instrumental, intrinsic values		• Reliability usually depicted through accuracy and precision in replications • Limited focus on representation of stakeholders		• High initial resource requirements to develop the approach • High data needs	
How to improve the 3Rs	• Design of the valuation in dialogue with policy and scientific experts can greatly improve the relevance		• Testing model concepts in different settings • Transparency and documentation		• Capacity building and developing collaboration among data holders and modelers and ultimate users	
Strenght of the evidence						
Integrative method: **Participatory mapping**	• Participatory valuation technique to elicit place-based values of nature • Versatile and adaptable to a large number of socio-ecological contexts • Applicable to broad and specific values • Instrumental, intrinsic and relational values		• Reliability in replicating the same results is generally low. • Stakeholders' representation in the process is generally at high level		• Modest to low initial data and infrastructure • Time consuming in planning the valuation activity • Require engagement with the relevant social groups	
How to improve the 3Rs	• Increasing public participation • Improving spatial data quality		• Considerations on fairness and equity in the process and stakeholder representation • Finding scalable mapping techniques to suit spatial decision contexts		• Good facilitation skills • Allowing time for qualitative data collection and interpretation	
Strenght of the evidence						
Integration method: **Cost-Benefit Analysis (CBA)**	• Applicable to combine instrumental values measured in monetary terms (market and non-market) • Versatile and applicable to different socio-ecological contexts • Allow ranking of alternative options that vary in monetary costs, monetary benefits, and time period		• High reliability in replicating the results when adhering to good practice guide • Sensitive to the consistency of the value concepts used and the aggregation rules used • Sensitive to choice of discount rate • Stakeholders' engagement in the process is generally low but all stakeholders are in principle included in the evaluation		• Moderately data intensive, hence, rely on existing socio-economic and environmental data • Moderate time and costs to conduct evaluation • Requires moderate to high level of skills or knowledge about economic analysis	
How to improve the 3Rs	• Sensitivity analysis • Inclusion of uncertainty		• Considerations of equity and justice aspects in the analysis • Increasing stakeholders in the definition of the scope of the valuation		• Following good practice guide • Careful planning	
Strenght of the evidence						
Integration method: **Multi-Criteria Decision Analysis (MCDA)**	• Allow ranking of alternative options that vary with respect to multiple criteria • Accommodate different value dimensions • Versatile (many different types of Multi Criteria Decision Analysis) and widely applicable to varying socio-ecological and decision-making contexts		• Often high reliability on outcomes but the outcomes are the result of trade-offs across different decision criteria and sensitive to weights. • Often high level of representation of different stakeholder perspectives in the decision-making process		• Moderate in time and resource requirements • Can be adjusted to available resources	

	RELEVANCE Diverse values and socio-ecological contexts		ROBUSTNESS Reliability and fair representation		RESOURCES Initial capacity and costs and time for valuation	
	Values	Contexts	Reliability	Fair representation	Capacity	Conducting valuation
How to improve the 3Rs	• Relevance can be improved by having good practice guide on inclusion of stakeholders, quantifying uncertainty, and overcoming negotiation difficulties when large number of stakeholders (groups) are involved in decision-making		• Improving transparency of the process, in particular how weighting of criteria is implemented • Incorporate uncertainty		• Choose the Multi Criteria Decision Analysis tool which match resources available	
Strenght of the evidence						
Integration method: **Deliberative decision process**	• Process to form a value judgement in an open dialogue • Accommodate broad and specific values • Instrumental, intrinsic and relational		• Designed to ensure fair representation of arguments • Conducted with few individuals and can suffer from small-sample bias and thus less reliable • Sensitive to who is participating		• Low initial investment costs • Moderate time costs for the valuator to prepare the activity • High time commitment from participants and potentially compensation for participation	
How to improve the 3Rs	• Design process in dialogue with policy and scientific informants • Relevance can be improved with more testing in different nature valuation context		• Transparency about representation • Careful facilitation • Management of power dynamics		• Careful planning and coordination • Testing of guidelines	
Strenght of the evidence						
No valuation: **Benefit Transfer (BT)**	• Increasing application in policy and practice • Specific to monetary – use and non-use values • Applicable to specific values		• Reliability is contingent on availability of suitable value estimates and capacity of transfer procedures to calibrate transferred value information (adjustments) – not always high, often moderate • Limited or no representation of stakeholders or other social considerations (equity and fairness) in the transfer process		• Quick, efficient and cost effective • No need for additional resources for new valuation studies • Requires moderate to high statistical/analytical knowledge and skills to adhere to best practice	
How to improve the 3Rs	• Increasing primary studies for value estimates • Covering broad range of nature's contributions to peoples, species, and socio-ecological contexts • Better characterization of valuation and application contexts (matching the sites)		• Improving benefit transfer procedures or value moderation processes • Increasing stakeholder consultations in use of transfers • Bridging the gap between research and practice		• Adhering to good practice guidelines	
Strenght of the evidence						

The valuation methods are suitable for different decision-making contexts. Below we exemplify common contexts where the methods can provide useful insight.

Ecosystem service mapping. This method can help to link biophysical characteristics with ecosystem services to assess nature's contributions to people. They are mainly suitable for informative and decisive use related to spatial planning **(Box 3.2)**. Multiple mapping tools are available, but most are data, time and capacity (skills/knowledge) intensive. There is a trade-off between user friendliness and accuracy of the results based on data quality and tools used. Illustrative examples of the applications to support decision-making includes Naidoo *et al.* (2008), Vorstius & Spray (2015); Maes *et al.* (2012).

Biodiversity priority mapping. The methods in this category can help to estimate species population, distribution or abundance using multiple data. They are useful for informational or decisive purposes (i.e., biodiversity prioritisation); but do not elicit species values as such. Their application requires modelling infrastructure (data and software) and implementation costs if applied for biodiversity assessment and monitoring purposes. Illustrative examples of the applications to support decision-making include Jetz *et al.* (2019); Meller *et al.*, (2014); SANBI & UNEP-WCMC (2016).

Stated preferences. These methods have mainly been used for informative policy purposes, but applications for decisive and technical purposes are also reported. An example of the use for as a technical purpose is the use of a choice experiment conducted with farmers for the design of an agro-environmental scheme in Germany (Breustedt *et al.*, 2013). The choice experiment was used to define the compensation requirements for the programme. Another example is the contingent valuation study conducted to estimate damages to nature caused by the British Petroleum oil spill in the Mexican Gulf in 2010 (Bishop *et al.*, 2017). One advantage of the methods is that it allows for estimation of non-use values (see 3.3.2.2).

Q-sorts. The methods can help understand conflicts and different positions about virtually any topic (both broad and specific value perspectives) but does not elicit values as such. The methodology is mainly suitable for informative use and scoping of valuation processes. The methodology is not suitable for generalisation to higher social scales as it is sensitive to small sample bias. It does not require large infrastructure but is still time consuming to develop for a specific policy question. Illustrative examples of the applications to understand value perspectives include Rust (2017); Mazur & Asah (2013); and Zabala *et al.* (2018).

Revealed preferences. The methods can be used to estimate specific values; they implicitly elicit the instrumental values of nature. Can be used for informational, decisive purposes and technical purposes. The methods are data intensive both in terms of socio-economic data and data on the aspects of nature that the valuation seeks to assess. Low on-going costs are needed to conduct new valuations on the same policy question. Illustrative examples of the applications to support decision-making include Pandit *et al.* (2014); Johnston *et al.* (2017); Heagney *et al.* (2019).

Livelihood assessments. The methods can help to understand (rural) households' access and use natural resources. Useful to characterise specific values that are primarily instrumental through a resource dependency linkage. Can be used for informative and decisive purposes in decision-making. Requires time to engage with stakeholders, can be performed with low infrastructure (capacity) needs. Illustrative examples of the applications to support decision-making include Barnes *et al.* (2017) and Adams (2020).

Integrated modelling. This approach has been developed for decision support in different fields. As an example, hydro-economic modelling approaches have been developed to inform the implementation of the Water Framework Directive in Europe, identifying cost-effective programmes of measures as required by the Directive (e.g., Brouwer *et al.*, 2007). Brouwer's model development is built on a rich hydrological and economic data set based on a Dutch integrated hydro-economic accounting system. Hjerppe and Vaisanen (2015) developed an integrated model system for cost-effective river basin management of phosphorus. There is limited information on whether the increasing number of studies in this domain have been merely of informative use or whether they have been used for aiding decisions more directly.

Participatory mapping. The methods allow stakeholders to map out importance or values of natural resources. There are a range of methods requiring localised information in order to use geographic information tools. Applicable for specific or broad values; commonly used for instrumental and relational type of values based on mapping and stakeholders' consultations. Resource needs in terms of time and costs can be adjusted and can be applied to many socio-environmental and socio-cultural contexts. Illustrative examples of the applications to support decision-making include Palomo *et al.* (2011), Wolf *et al.* (2015), Brown & Kyttä (2018) and Fagerholm *et al.* (2021).

Cost Benefit Analysis. This method aggregate benefits and costs of alternatives; use money metric to provide relevant information for decision-makers to choose between investment or policy options. Sensitive to the choice of discount rates, and availability of benefits and costs information. Can't accommodate non-monetary values. Moderate requirements in terms of existing data. Illustrative examples of the applications to support decision-making include Song *et al.* (2018) and Markanday *et al.* (2019).

Multi-criteria Decision Aid. The method can be used to integrate value estimates based on multiple criteria or weightings. Applicable to specific or broad values that are instrumental, intrinsic and relational in nature. Do not elicit values per se on its own but can help value integration. Can capture multiple stakeholder views. Result is contingent on weightings applied for different criteria. Not much initial investment required for application for many versions of Multi Criteria Decision Analysis. Illustrative examples of the applications to support decision-making include Kurth *et al.* (2017) and Adem Esmail & Geneletti (2018).

Deliberative Integration methods. This method can be used for decisive policy purposes in a wide range of contexts where a judgement on a course of action impacting multiple stakeholders (often in diverse ways) needs to be made. The method is not widely used (see 3.2.2.4) but can potentially allow for representation of multiple types of values among diverse social groups in relatively resource efficient ways. An illustrative example of the use of the methods is in the context of placement of wind turbines in landscape (Mehltretter Drury *et al.*, 2021).

Benefit Transfer. The method allows transferring specific values that are mostly instrumental from studied site to a

policy site with relevant adjustments. Prone to discrepancies on values based on (match or mis-match) of sites, transfer methods applied, species or services under considerations. Can be used for informational and decisive purposes. No investment and implementation costs needed if suitable value databases exist but generating values for a particular policy purpose requires time. Illustrative examples of the applications to support decision-making include Johnston *et al.* (2015); Subroy *et al.* (2019); Plummer (2009).

The analysis in this section has highlighted that there are trade-offs in method choice and that no method performs highly on all criteria. It is therefore important to clearly define what the objective of a valuation is and which types of risks that are most important to avoid. The analysis also illustrates that a combination of methods may be needed to fully answer to a given policy question (see 3.3.1.3). Further material on choices in valuation processes can be found in Section 3.4.

3.3.4.1 Trade-offs and complementarities in economic valuation initiatives

In this section we use the 3Rs framework to highlight trade-offs and complementarities between three main high level economic nature valuation initiatives, The Economics of Ecosystem Services and Biodiversity initiative (TEEB, 2010), the United Nations System of Environmental and Economic Accounts – Ecosystem Accounts (UNSEEA EA) and Comprehensive Wealth approach (similar to the inclusive wealth approach) recently advocated in the Dasgupta Review (Dasgupta, 2021) (see 2.2 and 6.2). The Economics of Ecosystem Services and Biodiversity initiative promotes that using a wide range of valuation methods, which are suited and can be adapted for valuation of different projects and policies, can enable inclusion of nature's values in decision making (see reviews of the economic valuation methods in section 3.2.2). More material on the United Nations System of Environmental-Economic Accounting can be found in Chapter 4 and in **Box 3.7.** In this section we briefly give an overview of the Comprehensive Wealth approach as a methodology to account for nature's values.

The concept of Comprehensive Wealth (CW) is a reflection of how values measured in terms of well-being and prosperity of a country depend not just on the returns from physical and human capital, as reflected in typical national accounts, but also on environmental and social capital. The reason Comprehensive Wealth is proposed is that using this concept in valuation, well-being at any

Box 3 7 **Natural capital accounting: the system of environmental economic accounting (SEEA).**

Natural capital accounting applies economic and accounting principles to the description and management of the environment with the aim of aiding environmental and economic decision-making. This requires measuring biophysical aspects (quantities and qualities) as well as socio-economic values, assigning them to aspects of the natural world and recognising the connections to (groups of) individuals and businesses. The System of Environmental-Economic Accounting (SEEA) is the statistical framework endorsed by the United Nations Statistical Commission as the way in which natural capital accounting can be supported by official statistics (United Nations *et al.*, 2014a; 2014b).

This summary gives an overview of the System of Environmental-Economic Accounting and its role in integrating data to inform discussion of the connections between people and the environment, pointing to some main opportunities and challenges.

The System of Environmental-Economic Accounting develops internationally agreed concepts and definitions pertaining to the measurement of environmental flows (e.g., water, energy, waste and emissions); environmental transactions (e.g., environmental taxes and expenditure); natural resources (e.g., minerals, timber, fish) and ecosystems and the services they provide. Work on the System of Environmental-Economic Accounting was initiated in the 1970s gaining momentum from the Earth Summit in Rio de Janeiro in 1992 and through ongoing testing and development by statistical agencies. More recent work has shown the connection to monitoring progress towards the Sustainable Development Goals and the targets of the Convention on Biological Diversity (see 4.6.4.2, Chapter 4).

Its origins lie in adopting and extending the accounting principles, classifications and definitions of the System of National Accounts that are used to underpin economic statistics, including gross domestic product. While originally focused on adjusting measures of gross domestic product for the effects of depletion and degradation, the focus of the System of Environmental-Economic Accounting has broadened to cover the general integration of physical and monetary environmental and economic data. As a statistical standard, the System of Environmental-Economic Accounting pursues the consistent comparison and exchange of data and aims to underpin a range of applications, including the derivation of coherent and consistent indicators that reflect the impacts and dependencies of the economy on the environment.

The broadening of the measurement and valuation context using accounting principles builds on a range of literature (Banzhaf & Boyd, 2012; Dasgupta, 2009; Haines-Young & Potschin, 2010; Keith *et al.*, 2013; Obst *et al.*, 2016; Vanoli, 1995) and consists of several advances:

Box 3 7

First, the System of Environmental-Economic Accounting *extends the definition of assets* to incorporate all biophysical components irrespective of their degree of economic ownership or flows of benefits in monetary terms. This broadening in biophysical terms provides the basis for recording a more complete range of interactions between the environment and the economy and provides physical measures to complement monetary valuations. More recently, this scope has expanded to capture ecosystem extent (area) and condition (ecological integrity) across the terrestrial, freshwater, subterranean and marine realms.

Second, in accounting for ecosystems, the System of Environmental-Economic Accounting *incorporates a wider scope of* benefits than conventional measures of income and production by including a range of ecosystem services. These services include air filtration, climate regulation, flood mitigation and amenity-related services that are commonly non-market services and hence not explicitly identified or valued in the national accounts. The extended accounting framing builds on recognition of the exchange value of these services, as well as the flows in physical terms, and hence could support reporting on measures of ecosystem degradation and enhancement in response to human uses of the environment, aspects which are missing from the current national accounts.

Third, progress in the implementation of the System of Environmental-Economic Accounting, especially concerning ecosystem accounting, has highlighted *the importance of spatial data and local contex*t. The organisation of data at detailed spatial scales supports recognition of a larger diversity of contexts in the supply and use of ecosystem services and can improve understanding of environmental and social outcomes.

However, several on-going challenges exist in advancing implementation of the System of Environmental-Economic Accounting:

First, there is the need to *move beyond the compilation of accounts* to the use of accounting data in applications and decision-making processes. This will require ongoing engagement with a variety of users to realize and demonstrate the added value of the System of Environmental-Economic Accounting.

Second, there is a need for the System of Environmental-Economic Accounting to build links to the *discussion of diverse value perspectives*. While the System of Environmental-Economic Accounting does have a specific approach to monetary valuation based on exchange values, that supports integration with the national accounts (and excludes consumer surplus), it does not have an aim to provide a "single value of nature". At the same time, the System of Environmental-Economic Accounting organisation of data on ecosystem extent, ecosystem condition and the physical flows of water and energy allow moving beyond a narrow market exchange view of accounting.

Third, there is a need for further research on several *aspects of measurement and valuation.* Through the revision process of the System of Environmental-Economic Accounting Experimental Ecosystem Accounting manual (2018-2021), significant progress has been made in harmonising definitions of ecosystem units, types and qualities, in providing comparable definitions for ecosystem services, and in discussing monetary valuation techniques for integration with the national accounts. Work will be needed to refine and test these areas, as well as advancing the measurement of concepts such as ecosystem capacity, and the use of detailed spatial data to support both local, national and global decision-making processes.

From a valuation perspective, the System of Environmental-Economic Accounting aims to broaden traditional accounting by adding part of natures' values to an instrument currently inconsiderate of these values. Beyond the use of the System of Environmental-Economic Accounting's biophysical data to assess non-monetary values, the future development of pilot and experimental accounts might provide complementary data reflecting additional monetary value perspectives currently not reflected in an accounting context, such as consumer surplus and welfare values, non-use and relational values.

The System of Environmental-Economic Accounting is a major program with a very high potential impact. The step from 'market values of economic assets' to 'market and non-market values of economic and natural assets' may seem small from the perspective of value plurality. However, this approach to accounting might further challenge the standard application of economic theory, could lead to transforming standards for environmental measurement and may pave the way to a more plural accounting of nature-human relations.

given time is determined by the returns to national wealth. Comprehensive Wealth is therefore intrinsically related to sustainable economic development (SED) (Hamilton & Hepburn, 2017). Current measures of economic performance, such as Gross Domestic Product (GDP), do not reflect sustainability, as it is a measure of economic flows (see 2.2). It is possible that gross domestic product grows over time solely as a result of running down the national wealth. The Dasgupta Review on the Economics of Biodiversity argues that global growth is being maintained by erosion of regenerative natural capital and biodiversity (Dasgupta, 2021). Since the 1970s, economists have shown that sustainable economic development is strongly related to comprehensive wealth. They conclude, that if comprehensive wealth goes up, future well-beings will not decline, and if comprehensive wealth declines, future well-beings are certain to decline (Arrow *et al.*, 2012; Hamilton & Clemens, 1999). Using a comprehensive wealth approach

to valuation of nature therefore has direct policy implications: i) Governments should change measures of performance to include measures of comprehensive wealth; ii) natural capital should be valued and monitored over time; and, iii) rents from non-renewable resources (which value the decline in this form of capital) should be reinvested in other forms of capital to maintain Comprehensive Wealth (e.g., Barbier, 2019; Dasgupta, 2021).

The valuation of natural capital is therefore essential for these policy recommendations to work and needs input from both natural scientists and economists. However, there are severe data limitations, particularly for the measurement of biodiversity.

In practice, several studies have aimed to operationalize the comprehensive wealth approach. Among the empirical studies that demonstrate the theoretical principles, early work by Hamilton and Clemens (1999) placed monetary values on natural resource depletion in developing countries, albeit limited to non-renewable resources, deforestation and CO_2 emissions. Their review showed a mixed picture for the period 1970-1993 in which 'Genuine Savings' (aggregate savings minus natural resource depletion) was negative for many countries; and Comprehensive Wealth declined and growth in incomes was therefore unsustainable. Particularly in Sub-Saharan Africa and the Middle Eastern states, reinvestment of resource rents was insufficient to maintain overall wealth, and natural resource depletion was excessive. In a counterfactual analysis, Atkinson and Hamilton (2016) show a similar scenario in the UK with respect to North Sea Oil. They show that had the United Kingdom invested its resource rents during the 1970s and 1980s rather than consumed rents to finance tax breaks, its national wealth would now be much higher than it is today. Similar evidence can be found in Hamilton and de Ruta (2006) who analyse a selection of countries to illustrate how simple aggregate savings rules, including investing resource rents (the Hartwick Rule (Hartwick, 1977)) would have left many countries with larger comprehensive wealth. The Comprehensive Wealth literature illustrates the importance of long-term thinking and how important it is for long-term well-being to value natural resource depletion and then invest equivalent amounts to sustain wealth. Helm (2015) makes the case that natural capital should also be the recipient of investment for this purpose.

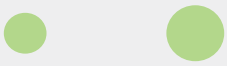
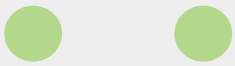
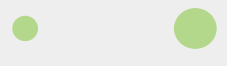
The World Bank's (2010) comprehensive wealth accounts were estimated across the world including natural resource wealth: agricultural land, urban land, pasture land, energy and mineral resources, forest resources and protected areas. Natural resource wealth was found to make up 25% of national wealth in poor countries. A broader theory and set of results can be found in Arrow *et al.* (2012) in which Comprehensive Wealth measures, which include a broader array of categories, are calculated for the United States, China, Brazil, India and Venezuela using publicly available data. The headline results show that typical gross domestic product growth is woefully inaccurate as a measure of long-run well-being, and that growth in comprehensive wealth while largely positive, is composed of negative growth in natural wealth coupled with positive growth in human, health and occasionally manufactured capital (Arrow *et al.*, 2012). The Dasgupta Review made measurement and reporting of Comprehensive Wealth a central policy recommendation for living within the limits of environmental constraints (Dasgupta, 2021).

The terms Inclusive Wealth and Comprehensive Wealth have the same theoretical underpinnings: that non-declining wealth means non-declining inter-temporal well-being over time, but historically the need for different terminology reflects different means of measuring and valuing national wealth. Comprehensive Wealth is the term used by the World Bank and measures wealth across manufactured, human, natural and other capitals by calculating the present value of future consumption that will not reduce national wealth: i.e., sustainable consumption (see e.g., Hamilton & Hartwick, 2005; World Bank, 2006). The Inclusive Wealth measure proposed by Arrow *et al.* (2012) and used by the United Nations in its wealth accounting (UNU-IHDP & UNEP, 2014), values national wealth and its capital stocks directly by estimating physical units of capital and multiplying them by a social price. In essence, Comprehensive Wealth uses the present value of a flow of benefits to estimate national wealth, the latter directly estimates the stock of national wealth. The different approaches to measurement have different practical implications concerning data requirements and the treatment of Intangible Capital like Human Capital. Yet as attempts to measure sustainability they are similar policy proposals.

Polasky & Dampha (2021) provided a review of the Inclusive Wealth approach as an indicator for sustainable development. They concluded that estimating a full value of inclusive wealth in practice would be near infeasible due to data demands and that *'no current measure of inclusive wealth is in fact fully inclusive'*. They propose that combining a semi-inclusive wealth indicator with indicators of changes in critical natural capital could provide a set of signals to decision-makers of whether society is following a sustainable development trajectory.

In conclusion, the theoretical concepts underpinning the Comprehensive Wealth/Inclusive Wealth approach are well established. The empirical examples are connected to biodiversity through the land and forest resources that are included in the operationalization of the concepts. However, the approach does not directly evaluate the impact on biodiversity and ecosystem services of declining natural capital stocks nor value these changes (Polasky & Dampha, 2021). The overall wealth accounting initiatives are important steps in accounting for the composition of

Table 3 11 **Comparison of the relative merits of The Economics of Ecosystems and Biodiversity, United Nations System of Environmental Economic Accounting (UN SEEA EA) and the Inclusive Wealth approach using the 3R criteria (Relevance, Robustness and Resources).**

	RELEVANCE Capturing diverse values in multiple socio-ecological contexts		ROBUSTNESS Ensuring reliable (accurate and valid) and fair representation of stakeholders		RESOURCES Resource requirements for capacity building and resources for conducting valuation	
	Values	Contexts	Reliability	Fair representation	Capacity	Conducting valuation
Integrating economic initiatives						
System of Environmental Economic Accounting (UN SEEA EA)	• Instrumental values • Physical and monetary exchange values • Applied to ecosystem extent, condition, ecosystem services • Applied to thematic accounts for carbon, biodiversity, oceans and urban areas		• Standardized methodologies are reliable for the purpose of national accounting • Representative at national sectoral level, but not representative of all local values at local level, despite high biophysical resolution (lower spatial granularity for monetary methods)		• High initial resource requirements (geoinformatics and geospatial data, location specific economic data) • High implementation costs (annual compilation at national level)	
How to improve the 3Rs	• Complementary accounts bridge to welfare values, inclusive wealth, corporate natural capital accounting		• Improve availability of data at national level • Validate using local data • Higher spatial resolution of monetary valuation methods • Uncertainty analysis for aggregates		• Capacity building and developing collaboration among national data holders, researchers, statistical agency compilers and modelers and ultimate users. • Standardization and automation of workflows	
Strenght of the evidence						
The Economics of Ecosystems and Biodiversity	• Instrumental values but allow assessment of multiple types • Allow accounting for social, cultural and political context of decision-making • Design valuation to answer specifically to policy needs		• Allow prioritization of stakeholder needs through participatory design of the valuation • Design valuation to assess the impact on different groups • Some inconsistencies in value indicators, as different methods, different value concepts		• Can be designed to resource availability to some extent • Each valuation process is adapted to the policy question but optimization of resource use can come from training of valuators, building of core data sets for a region/country and use of best practice guidelines	
How to improve the 3Rs	• Use of complementary methods • Using pilots routinely to ensure relevance to stakeholders • Following reporting standards to allow others to use learn from the experiences		• Engagement with local stakeholder in design of valuation • Engagement with policy and scientific experts in design of valuation • Adherence to best practice guidelines and updating of practices		• Open access to environmental and socio-economic data, training of valuators, and widely accessible best practice guidelines	
Strenght of the evidence						
Comprehensive/ Inclusive Wealth	• Instrumental values • Includes social capital (education, health) • Mainly applied to renewable and non-renewable natural resources (stocks and flows) • Country scale		• Theoretically consistent welfare indicators • Includes dynamics of both the economy and the natural resources • Represents all sectors and demographic groups included in national counts		• High initial resource requirements to acquire data on natural resource stocks but can build on UN System of Environmental Economic Accounting (UN SEEA EA) efforts • Rely on data that exists in many countries	
How to improve the 3Rs	• Operationalizing the approach		• Improve data sources and represent a wider range of natural resources and biodiversity considerations		• Build on UN System of Environmental Economic Accounting data sources and infrastructure	
Strenght of the evidence						

economic development and understanding its sustainability in terms of well-being and the natural environment. Inclusive Wealth accounting goes beyond gross domestic product to look at stocks rather than flows and provides a more comprehensive and longer-term perspective of the consequences of economic activities.

In **Table 3.11** we compare the relative strength of the three initiatives. The primary objective is to highlight how complementary approaches can support diverse needs. The initiatives can also provide data sources that jointly be used for multiple purposes and therefore reduce the overall resource needs for valuation (Annex 3.14).

The analysis shows that the initiatives are complementary. The economics of ecosystems and biodiversity (TEEB), as a flexible policy evaluation tool, is more adaptable to emerging decision-making needs. United Nations system of environmental economic accounting (UN SEEA EA) provides an opportunity to link biophysical ecosystem accounts to national economic accounts and improving the information for decision-makers to do nature valuation. Inclusive wealth has its strength in the theoretical consistency for measuring sustainable economic development. However, data shortages are still hindering full implementation in practice.

3.4 GUIDANCE FOR VALUATION PRACTICE

Previous sections have demonstrated that there are no perfect methods; that – for a comprehensive valuation – several complementary methods will usually need to be combined; and that a careful play of balancing trade-offs between relevance, robustness and resources is inevitable. Moreover, since the purpose of the valuation drives many of the method choices that must be made, and context-specific conditions influence what works or cannot work in a given situation, it would be imprudent to suggest that clear-cut recipes exist that match methods to purpose and contexts.

Hence, this section combines the lessons learned from the assessment of methods conducted in this chapter to provide general, yet practical guidelines aimed at avoiding irreversible or expensive social, financial or environmental errors. The aim of the guidelines is to ensure that – for different contexts and purposes – the valuation process is designed to adequately inform decision-making and policy design for nature while also accounting for the 3Rs. The guidelines for valuation synthesise theoretical principles of valuation identified in this chapter into clear and useful valuation questions to guide valuation experts or commissioners of valuation studies in a stepwise manner. The valuation process is therefore presented in five steps.

3.4.1 Valuation is a step-wise process

The valuation process can be summarised into five steps. Valuation is often seen as a merely technical process of choosing and applying a method fit-for-purpose, but the assessment clearly shows that the relevance, robustness, and resource-efficiency of a valuation depends heavily on the normative and political context of the valuation and positionality of the valuator. In that sense, a 'valuation' is the entire 5-step process. Choices made in each step affect the next step and go on to affect the final quality of the valuation. The steps are also interacting rather than fully discrete steps through time. Following these steps explicitly, and transparently reporting on the choices made, improves the quality of the information and processes that valuation generates, and covers key considerations of the valuation process. The steps are:

- **Step 1 – Construct a legitimate process.** This requires that the providers of valuation information are explicitly defined, and that there is transparency about how a robust valuation is ensured particularly in regard to representativeness or participation. Whenever relevant, they should be informed or engaged in the upcoming valuation study.

- **Step 2 – Define the purpose and intended use of the valuation outputs.** While the purpose is often clear from the decision context or it is defined by the socio-environmental problem that is triggering the valuation, the valuation process can often benefit from fine tuning and (re)defining this purpose once stakeholders have been engaged in the first step.

- **Step 3 – Establish the scope of the valuation.** This requires defining thematic and geographic boundaries of the valuation and ultimately, determining who can be considered as a legitimate and relevant stakeholder of the valuation process. This step helps clarify whose values are being represented and helps identify which stakeholders (and thus, whose values) might have been omitted in the first and second steps. Feasibility constraints – in terms of financial, human and technical resources – are evaluated at this stage. This step interacts with step 1 and 2.

- **Step 4 – Choose and apply the valuation methods.** With the purpose of the valuation clear and having identified the diversity of interests and stakeholders at play and being aware of the resource limitations impinging on whatever process or outcomes are decided upon, the appropriate methods can be selected. In most cases, a combination of nature-based, statement-based, and behaviour-based are needed and their findings can be brought together with integration

methods. This step requires acute awareness of the limitations of certain methods and approaches, of the processes that have been developed to counter some of the limitations and designing around those.

- **Step 5 – Articulate results in decision-making.** The findings of valuation results need to be presented in a way that makes them easy to understand and to uptake into decision-making. This requires effective and transparent communication of the outputs and honest reflection of the limitations and omissions of the valuation process. Importantly, any factors that pose risks to the uptake of valuation results should be explicitly reported.

For each step, a set of valuation questions are provided to guide the valuator along with a short description of the valuation principles that apply. References are provided to the section in the chapter where more detailed information is available **(Figure 3.43)**.

3.4.1.1 Step 1- constructing a legitimate process

Valuation of (changes in) nature departs from the fundamental notion that people and communities depend on nature (albeit to different extents) and these dependencies must be secured. While it is important to consider all groups and communities and their diverse values, dependencies on nature are usually disproportionate across groups in any given society. Access to the valuation process needs to account for existing and historical differences. Moreover, the power to influence decisions on what counts, and thus which values and whose are prioritised, also varies strongly between social groups. Lastly, some groups (such as past and future generations) and entities (such as animals, mother nature and other non-human beings) do not have a direct way to communicate their values, hence their representatives might be needed (e.g., the elderly, historians, religious and spiritual leaders, the youth).

Step 1 – Valuation Questions – constructing a legitimate process

Step 1 relates mainly to relevance and robustness consideration. What is considered to be the community of justice, how is fair representation ensured (see 3.3.2.3) and which forms of knowledge need to be included (see 3.3.1.2). Furthermore, step 1 designs the procedures for transparent reporting. Assessment questions to consider in step 1 are:

1. Who is dependent on the (changes in) nature considered (people, social groups, communities)?

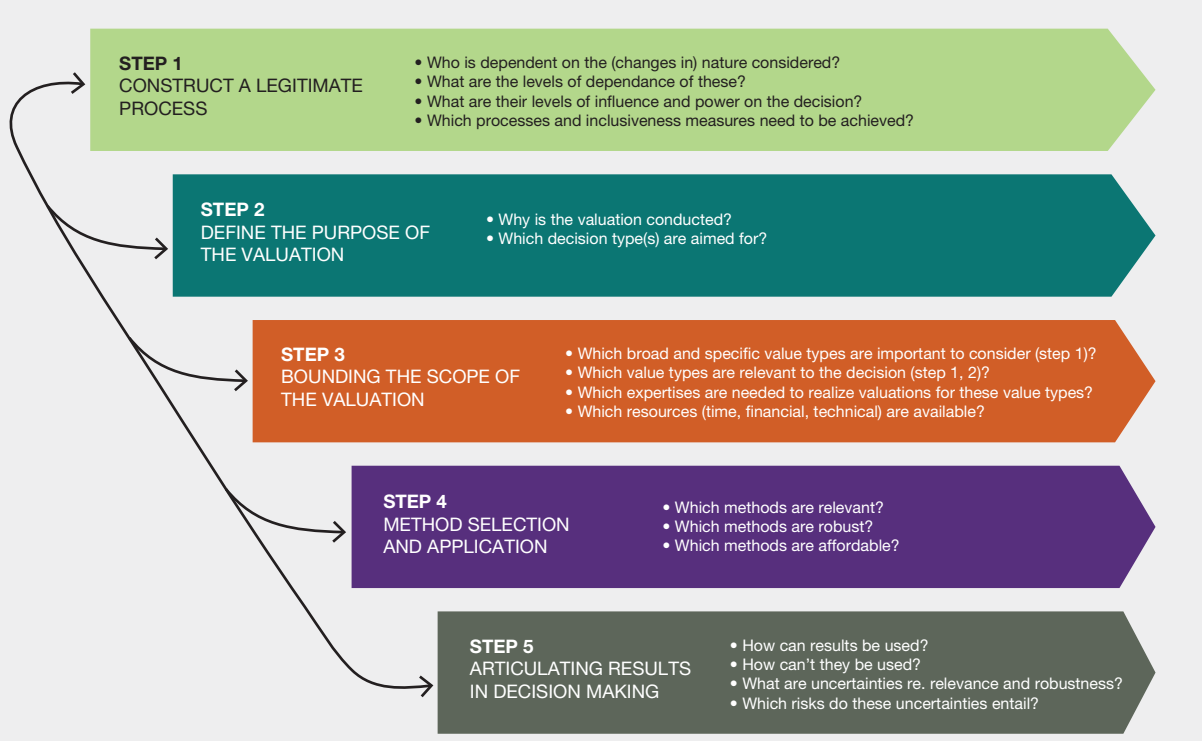


Figure 3 43 **Valuation process depicted in 5 steps.**

The choice and application of an appropriate (set of) valuation methods (step 4) is embedded within this larger process.

2. What are the levels of dependence of these people/communities on nature?
3. What are their levels of influence and power on the decision regarding nature?
4. Which groups of people (and non-human beings) need to be distinguished?
5. Whose values need to be represented?
6. Which people/groups/communities need to participate in the valuation process?
7. Which processes and inclusiveness measures need to be achieved?

Participation level is based on the depth of stakeholder engagement and the presence of actions to remove barriers for inclusion. The lowest level captures data and information coming from stakeholders, while at the highest level, stakeholders are actively involved in reviewing and validating outputs or processes. The representation level **(Figure 3.38)** depicts how diverse groups of stakeholders are targeted and recognized in the process as well as how the presentation of values is disaggregated for these groups.

In cases where valuation will be conducted in indigenous peoples and local community territories (land and sea), numerous guidelines exist on how to conduct ethically responsible research that takes into account the IPLC context where one is working (Annex 3.12). Some of these guidelines are locally specific and provided by specific indigenous peoples or local communities (for example, The Framework for Research Engagement with First Nation (University of Manitoba, 2014), Metis, and Inuit Peoples, or the San Code of Research Ethics (Chennels & Schroeder, 2017)), others are regional and include some communities and indigenous groups while others are much broader and represent many of them. A non-exhaustive list of existing guidelines for conducting research in indigenous and local communities is provided in Annex 3.15. It is generally recommended that one follows the most local guidelines available and if those are missing, to apply the next level of locally pertinent guidelines. In the absence of local, group-based or national guidelines, the General principles for ethical conduct in human research (NHMRC & Australian Research Council and Universities Australia, 2007) should be applied.

3.4.1.2 Step 2- defining the purpose of valuation

Valuations are initiated with a certain goal and purpose. In our chapter, goals are defined as broad societal 'missions' such as improving wellbeing, justice or nature itself, while purposes are the 'way how' valuations target a certain decision-making process. If goal and purpose are not explicitly stated when commencing with a valuation, it is impossible to assess which valuation is relevant. Based on decisions in step 1, the goals and purpose of the valuation can be stated, communicated towards or deliberated together with the relevant people, groups or communities. Transparency in this step mitigates the risk for valuations to be conducted or commissioned in ways that will result in outputs not being used, or even reproduce or aggravate injustices that the valuation aimed to reduce. Some important questions to define the purpose of valuation are the following:

1. Why is the valuation conducted?
2. Which decision type(s) does the valuation aim to inform?
3. How will valuation results target these decisions?
4. Who will be involved in decisions regarding these questions (adapt step 1 if necessary)?

The chapter has structured the evidence on why valuation is conducted, i.e., why is it relevant, by synthesising valuation goals into whether they seek to improve human well-being, ecological quality or justice or broader IPLC principles (see 3.2). Often a valuation has several goals and identifying these are helpful for targeting the activity. Furthermore, deciding how the valuation is intended to enable decision-making is also essential for better design of valuation. Is the valuation intended only to serve as informative, or is the valuation intended to support a decision-making itself, serving as a decisive support tool. Finally, the goal of the valuation may also be to support the development of policy instruments. For further information on the purposes of valuation (see 3.2.1.1 and 4.6). Defining the purpose of valuation is a prerequisite for deciding who should be involved (see 3.3.1.2, 3.3.2).

3.4.1.3 Step 3- scoping the valuation

Once the process and purpose are clear, a decision is needed on which values to cover with the valuation. Together with the involved stakeholders (or taking into account the groups that need to be represented) a wide inventory of relevant values can be made. Value typologies such as the one from this assessment (see Chapter 2) can be used to cover the diversity of values and check if no relevant values are overlooked. In this stage, it is possible -based on the broad and specific value types inventoried- that the purpose needs to be reformulated, either to broaden it to include values, or to focus it to better reflect the scope. This inventory then is confronted with the available resources and expertise. Additional valuation expertise might be needed, and resources might need to be spread across experts in order to cover the required value

diversity. Resource availability might require concessions to be made, either on relevance (e.g., excluding certain relevant value types) or robustness (e.g., choosing a quick screening method rather than a resource-intensive one) (see step 4 below). Important guiding questions to define the scope of the valuation are the following:

1. Which broad and specific value types are important to the people considered (step 1)?
2. Which value types are not relevant (enough) to the people considered (step 1)?
3. Which value types are relevant to the purpose of the valuation (step 2)?
4. What kinds of expertise are needed to realize valuations for these value types?
5. Which resources (time, financial, technical) are available?

3.4.1.4 Step 4- selecting and applying valuation methods

It is only once the process, purpose and scope are clear, that it becomes relevant to select adequate (sets of) methods for valuation and to apply them. This step is intertwined with the trade-off considerations regarding available resources in step 3, but also needs to take into account some inherent features of existing methods. This step critically requires involving open-minded experts from different disciplines to avoid disciplinary bias. Especially when judging on pros and cons of potential methods, it is essential to recognize diversity of valuation methods and approaches from different disciplines and traditions and recognize diverse types of evidence and ways to assess quality of valuations. The informed choice made in this step has immediate and large implications on the valuation results, and builds on the process, purpose and scoping steps. It is risky to skip these steps or leave them implicit, as the choice of method is then left to the person or group which happens to have the authority to decide this, but – because of inevitable social or disciplinary bias – does not necessarily realise, recognize or represent the full extent of value diversity entailed by the purpose.

In this section, the choice of methods that are appropriate for different contexts and purposes is illustrated by five hypothetical examples that typify the sets of considerations and contexts that valuations must navigate **(Table 3.12)**. These cases demonstrate how diverse contexts lead to different consolations of conditions that ultimately limit the consolation of appropriate and adequate methods. Although the cases themselves are hypothetical, they build on the diversity of valuation cases (n = 1163) that were reviewed for this chapter.

The illustrative cases – even if only concisely described – allow to distinguish different ways to answer the valuation questions in step 1, 2 and 3. While in reality, these answers can be elaborated and co-created with the relevant stakeholders as inherent part of the valuation process, differences in participation level, type of information and decision, and plurality level are clearly illustrated (see **Table 3.13**).

Based on the answers in Steps 1 to 3, the potential methods can be selected and applied. This is illustrated with the example table from Section 3.3.4 and the illustrated cases and their level of available resources. **Table 3.14** demonstrates that adequate sets of methods differ strongly between valuation contexts. In reality, more nuanced purpose definitions and resource descriptions applied over a larger set of available methods brought by different disciplines, through a more or less participatory process to take this key decision for valuation.

Step 4 operationalizes the trade-off between the 3Rs (see 3.3.4), but entails also a highly context-dependent component. Deciding methods to fit the purpose, decision types, involved values and actors, as well as process requirements, entails knowledge on methods' inherent features (see 3.2.2 on the review of different methods). However, methods' *inherent* features are hard to distinguish from context-specific application patterns, as methods can be combined or even recompiled into a mixed approach which combines several procedures (and disciplines) to fit the context. As such, *inherent* shortcomings of certain methods can be relieved (as well as strengths lost) depending on the way they are implemented in practice.

3.4.1.5 Step 5 – articulating the values for decision-making

For a valuation to be successful, its results need to inform and improve the decision that was originally envisaged. This *uptake* is dealt with in Chapter 4 of this assessment, but it is an important step in the valuation process. The defined purpose (step 2), based on a legitimate and relevant process (step 1) and defining the scope of the valuation (step 3), provides relevant, robust and resource-efficient results (step 4).

Each of these choices, however, has a flip side: which actors are not included, which aspects are not representative or participatory, which values are not targeted, and what are shortcomings of the methods chosen. This has immediate repercussions on how the results can be applied for their purpose. More importantly, applying values beyond their purpose entails risks. Based on the illustration cases below, in particular the one referring to the Wollah indigenous territory, using the values of nature elicited for the beaver dam would risk creating a conflict. Also, applying the

Table 3 12 **Illustrative example cases to illustrate valuation choices and method selection.**

The case descriptions are inspired by the in-depth systematic literature review (n=1163); any resemblance with real life cases is coincidental.

Goal and purpose of the illustrative case	SPECIFIC CONTEXTS AND CONDITIONS OF THE CASE			
	Risk of conflicts	Socio-political complexity	Socio-economic impact	Resources for valuation
Case A – "Humboldt Park" Urban planning – Local authorities commission development of vision plan for multifunctional green space in middle-class neighborhood	Low	Low	Low	High
Case B – "Rain River" Litigation – Court demands expertise for village court case against gravel extraction company for downstream river bank erosion.	High	Low	Medium	Medium
Case C – "Beaver Dam" Natural Resource Use case – National Law requires socio-environmental impact assessment for drinking water dam in uninhabited valley	Medium	Medium	High	Medium
Case D – "Breton Airport" Infrastructure development – valuation for NGO and grassroot organisation which contest airport development in rural area	High	High	High	Low
Case E – "Fancy Farm" Payment for Ecosystem Services design – Government commissioned design of compensation scheme for farmers' efforts to mitigate landscape degradation in rural region	Medium	Medium	Medium	High
Case F – "Wollah Hunting" Access to indigenous peoples' territories – for necessary culling of top predator populations, rangers or hunters need regulated access	Low	High	Low	Low

Table 3 13 **Potential responses for the valuation questions guiding Steps 1, 2 and 3 of the valuation process, for each of the illustrative cases.**

	A "Humboldt Park"	B "Rain River"	C "Beaver Dam"	D "Breton Airport"	E "Fancy Farm"	F "Wollah Hunting"
Step 1 – valuation process => participation level	**Medium:** Experts and inhabitants	**Low:** Based on authoritative experts	**Medium:** Experts, actors from water and nature sector	**Medium:** Authoritative experts and local experts	**High:** Experts on ecology, farming economy and law, and local farmers.	**High:** Experts on ecology, indigenous representatives
Step 2 – valuation purpose => which info, for what	Accepted & legitimate; for design	Robust and focussed; for court ruling	Broad and reliable; for assessment	Broad and accepted; for campaigning	Robust and broad; for effective and fair design	Broad and accepted; for respectful agreements
Step 3 – valuation scope => Plurality level	**Medium:** Specific local ecological & wellbeing values	**Low:** Specific damages, biophysical processes	**Medium:** Diverse ecological, wellbeing values	**High:** Ecological values, broad wellbeing values	**Medium:** Wellbeing, broad values, ecological values	**High:** Broad values, principles, ecological values

Table 3 14 **Examples from the four method families, their main characteristics (see Table 3.10) and their selection for the six illustrative cases.**

Capital "M": main method; small caps "a": potential additional method. Note that this illustration only includes the example methods from Section 3.3.4: scores for the 3Rs are derived and summarised from Table 3.12. The illustrative method choice is based on general context descriptions from the cases: in reality, the range of potential methods is much larger, and contextual requirements more detailed.

Method examples	Relevance (see 3.3.1)		Robustness (see 3.3.2)		Resources (affordability see 3.3.3)		A	B	C	D	E	F
See 3.3.4	Suitable to a wide range of values	Suitable to a wide range of contexts	Suitable when accurate estimates are required	Suitable when fair representation of diverse stakeholders is required	Low data, skills and software is required	Low time and costs for the valuation is required						
ES mapping	Medium	High	Medium	Low	Low	High	a				a	
Biodiversity mapping	Low	Medium	Medium	Low	Low	Medium			a		a	
Stated preferences	Medium	High	Medium	Medium	Medium	Medium		a		a	M	a
Q sorts	Medium	Medium	Low	Low	Low	Medium	M					
Revealed preference	Low	Medium	High	Medium	Low	High		a	a			
Livelihood assessment	Medium	Medium	Medium	Medium	High	Medium					a	a
Integrated modelling	Low	Low	Medium	Low	Low	Medium		M	a			
Participatory mapping	High	High	Low	Low	High	Medium	a			M		
MCDA	High	High	Medium	Medium	Medium	Medium			M			
DIM	High	Medium	Low	High	Medium	Medium						M
Benefit transfer	Low	Medium	Low	Low	High	High				a		

values of nature elicited in the Humboldt Park visioning to the Breton Airport conflict case risks to generate irrelevant information. Different decision-making stages and the role of valuation in supporting these stages can be characterised in several ways (see 3.2.1.1 and 4.6).

Effective and responsible uptake of value information in decisions is a shared responsibility between the actors commissioning the valuation, the valuators and the diverse actors involved in it. This goes beyond transparent communication of values and assumptions, and requires engagement with the decision processes and actors in an early stage. See Chapter 4 for further reading on uptake of values in decision-making.

3.5 CONCLUSIONS, KNOWLEDGE GAPS AND RECOMMENDATIONS

The assessment of valuation methods conducted in this chapter has provided answers to the six assessment questions outlined in Section 3.1. The six questions encapsulate the scope of Chapter 3 in terms of what it was supposed to assess (valuation methods) and the numerous considerations of valuation that it was supposed to address (the ability of methods to fulfil numerous societal goals). Here, we provide a concise description of how the questions were answered and the responses for each based on the findings of the chapter. We also identify knowledge gaps that were detected and make some recommendations for how to address them.

Assessment question 1: **"Why is valuation undertaken?"** was answered by assessing the goals of applying valuation methods, as well as the various purposes in decision-making they aim to serve. We found that valuation is undertaken for a multitude of reasons, but primarily for informative followed by decisive purposes, indicating that valuations frequently aim to provide decision-makers with recommendations about the most desirable course of action **(Figure 3.14)**. However, published valuations are rarely linked to active decision-making processes suggesting that the aim to inform is merely hypothetical and that the information they generate is not channelled into decision-making. Valuation studies do not sufficiently address this uptake gap, however, through reflective evaluation and recommendations of ways to connect studies to actual decisions. With the help of contributions from ILK experts, we have been able to only scratch the surface on the nature of valuation in indigenous peoples and local communities. Further valuation work would benefit from linking directly to decision-making processes that require valuation. This would also help identify the nature of barriers to uptake, particularly whether limitations to uptake are method-related or context-related. For this to happen, better collaborations between academia (the biggest producers of valuation studies) and stakeholders associated with socio-environmental issues is needed. Valuation practice would also benefit from improved understanding of IPLC valuation through stronger collaborations with IPLC scholars and communities to learn how their ways of valuation could inform current valuation practice in non-IPLC contexts.

Assessment question 2: **"Which methods are applied?"** was addressed by inventorying the methods and approaches that were applied in 1163 valuation studies between 1980 and 2020, stratified and randomly sampled from a corpus of more than 79,000 valuation studies. To facilitate methods assessment, a cross-disciplinary classification system was developed (the methods family) that allowed grouping of a highly diverse list of methods based on some of their most basic characteristics (what they assess and their information source). We found that, while there is no scarcity of methods (more than 50 distinct methods exist) available to conduct valuation, most valuation studies only apply one and because methods are highly specific in terms of which values they are able to elicit, studies mostly fail to report on the full range of values at play. Given the diversity of methods and approaches, and the specific limitations and strengths presented by each of them, combining different complementary methods can ensure that valuations address diverse values and do so robustly. Method combinations require interdisciplinary valuations teams, capacity building in methods to ensure proper applications and sensitivity to the appropriateness of methods in different cultural and socio-economic contexts.

Assessment question 3: **"Which values are elicited?"** was implemented by applying the values typology introduced in Chapters 1 and 2 on methods, i.e., we assessed the extent to which methods were used to elicit broad values, specific values and which value indicators were used. Additionally, we assessed whether methods could generate information about live value frames and if they made reference to IPLC related principles or if they used or acknowledged knowledge systems from sources other than academia. We found that valuation studies have mostly focused on assessing instrumental values, followed by intrinsic and relational values.

On the contrary, valuation in IPLC contexts is mostly focused on relational and intrinsic values, in line with most IPLC worldviews. Outside IPLC contexts, most methods tend to be highly specific about the values that they can elicit or articulate, highlighting the importance of mixing methods to capture the full range of values at play in any given situation. In many cases, however, despite the versatility of methods to capture a wide range of values, their users only apply them to elicit one type of value. Knowledge gaps relate to both practical and theoretical challenges such as how to deal with representation aspects when aggregating individually held values to the collective, deliberating towards shared values, how to take the values of future generations into account, and how to sum, compare, or separate incommensurable value types. Ways to address some of these challenges have been developed for some methods, while other challenges contribute to some of the limitations of methods. Valuators need to be well versed in both the potential and shortcoming of methods to ensure that they harness the potential and are fully aware of the limitations of their findings.

Assessment question 4: **"When and where are valuations undertaken?"** was answered by assessing the global distribution of valuation studies based on when, where, and at which spatial and governance scales they were applied.

This included an assessment of which administrative, social and biophysical scales valuations have been done, and the habitats they were conducted in. The valuation atlas represents the first exhaustive global literature review on the distribution of valuations across a broad range of natural and social science disciplines, informed by a broad and interdisciplinary definition of valuation. Our findings show that, since the early 2000s, the practice of valuation has been gradually expanding globally. To date, one quarter of valuation studies have been about understanding values associated with forest ecosystems followed by cultivated areas and freshwater habitats. More than half of the studies are highly localised generating information about a specific location or species and only 1% have a global outlook. In IPLC valuations, place and location of valuations is highly relevant and the selection of where to undertake valuation processes is usually assessed and prepared. Knowledge gaps associated with the spatial and administrative scales of valuations relate to the need for better understanding the discrepancies and relations between who commissions or undertakes valuations and who is affected by the decisions that the valuation is commissioned for. Current practice in valuation suggests that valuation is usually conducted by the powerful with little to no meaningful participation of local stakeholders, risking that valuations might not adequately reflect the full range of values and perspectives at play in a given decision-making context (see Chapter 4).

Assessment question 5: **Whose values are considered?** This question was addressed by examining the inclusiveness of valuation methods in terms of whether and how valuations considered and/or engaged relevant stakeholders (including IPLCs) and how valuations dealt with representation, power and justice issues. In more than half of the studies, authors were not explicit about whose values are represented in the study. Even though valuations have become more participatory over time, the engagement of stakeholders is still mostly basic and extractive, with most studies that include stakeholders limit their engagement to data and information providers. This trend is particularly acute in valuation of IPLCs, risking that valuations perpetuate historical injustices. In an effort to counteract the trend, the chapter committed to reporting on IPLC valuation, only to find that it is a research topic that has barely gathered traction in the field of valuation. Integrated and statement-based valuation methods hold promise for engaging with stakeholders more meaningfully and ensuring they contribute to all steps of valuation design, implementation and interpretation. A large proportion of studies do not provide information on whether the stakeholders they worked with are representative of all actors with stakes, and even fewer reveal how they addressed issues of power and justice. The robustness of existing valuations is hugely undermined by an absence to report or adequately address these issues. Future valuation needs to train valuation experts to not only report on these issues, but also to incorporate adequate strategies to improve representativeness in studies. Knowledge gaps relate to inadequate understanding of IPLC valuation and lack of reporting and standards regarding representation aspects of valuation.

Assessment question 6: **"How reliable and feasible is valuation?"** was approached by highlighting the different ways that robustness is understood based on perspectives and disciplinary framing and assessing the data requirements, skills needed, finance and time costs. Consequently, we assessed the limitations of valuations and the extent to which applications consider issues of validity, consistency and transparency. Judging robustness is contested, however: while some sources of evidence emphasise legitimacy others emphasise theoretical consistency and accuracy. Both aspects are important for use and hence the impact of valuation. Practical guidance that is sensitive to the purpose of valuation could improve the robustness of valuation. Robustness requirements vary between informative, decisive and technical purposes and guidelines for robust use should reflect this. This would increase the potential of valuation to reach the intended goals and decrease the risk of (mis)informing decisions and producing perverse outcomes. With respect to resource requirements to judge the feasibility of valuation, such information is rarely reported and must thus be deduced from the complexity of the methods used, the context of studies, and the time taken to undertake valuations. As a result, a very important knowledge gap is the lack of information on feasibility and resources needed to perform valuations for different purposes. This is very likely to represent an important barrier to the inclusion of valuations in decision-making processes.

The chapter has gathered evidence from four global reviews, tapping into various strands of academic literature, and two global processes mobilising indigenous and local knowledge. While this provided a robust and in many instances exhaustive body of evidence, some obvious **gaps and blindspots** in our work must be noted. Firstly, by focusing almost exclusively on academic literature, we have not captured the large body of knowledge on valuation and valuation methods and approaches that has been generated outside of academia. Some valuation practice (e.g., conducted by the business sector, to assess health, or to address conflict resolution) is partially addressed in the chapter. However, a myriad more groups and actors conduct valuation and report it in non-academic literature. Additionally, because we focused on English-language literature, and that which is contained in journals indexed by Scopus and Web of Science, we have limited from our assessment valuation knowledge and experiences reported in languages other than English, or that have been reported in unindexed journals or journals from other indices. Given that IBPES assessments cannot undertake new research,

the extent to which we could include knowledge about IPLC valuation has been sorely limited; we acknowledge that the 26 essays on IPLC valuation informing this chapter and the ILK Dialogues that were conducted during the *values assessment* cannot be generalised beyond the communities that were consulted in the Dialogues or those who are described in the essays. We also acknowledge that the inclination to compare what is observed or described in IPLC valuations to what is seen elsewhere can seem like an attempt to validate indigenous and local knowledge by imposing western science worldviews and frameworks. This was by no means our intention. On the contrary, we hope that the coincidences observed across cultures and worldviews help demonstrate the commonalities of valuation shared across humanity and that this invites desire for collaboration and intercultural dialogue.

Finally, while assessment findings and patterns assessed are situated at a global and general level, the chapter has also provided **guidance for valuation**, which – despite inevitably situated on a general level – provides clear principles and concerns to be taken into account by various actors active in valuation, from valuation professionals, to local-to-global decision-makers commissioning valuation studies, to experts evaluating and reviewing valuation studies or policymakers using valuation results to underpin or justify decisions.

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Chapter 4

VALUE EXPRESSION IN DECISION-MAKING[1,2]

COORDINATING LEAD AUTHORS:
David N. Barton (Norway, United Kingdom of Great Britain and Northern Ireland/Norway), Rebecca Chaplin-Kramer (United States of America), Elena Lazos Chavero (Mexico), Meine van Noordwijk (Netherlands/Indonesia, CGIAR)

LEAD AUTHORS:
Stefanie Engel (Germany), Alexander Girvan (Jamaica), Thomas Hahn (Sweden), Beria Leimona (Indonesia), Sharachchandra Lele (India), Roldan Muradian (Netherlands/Brazil), Aidin Niamir (Islamic Republic of Iran/Germany), Begüm Özkaynak (Türkiye), Agnieszka Pawlowska-Mainville (Canada, Poland/Canada), Paula Ungar (Colombia)

FELLOWS:
Sara Nelson (United States of America/Canada), Cem Iskender Aydin (Türkiye), Pricila Iranah (Mauritius/United States of America)

CONTRIBUTING AUTHORS:
Liliana Bravo-Monroy (Colombia), Dominic A. Andradi-Brown (United States of America); Gabby N. Ahmadia (United States of America); Aristide Andrianarimisa (Madagascar); Adeniyi Asiyanbi (Nigeria); Beste Gün Aslan (Türkiye); Nigel Asquith (United Kingdom of Great Britain and Northern Ireland); Duygu Avci (Türkiye); Ezelnur Aydemir (Türkiye); Begüm Aydın (Türkiye); Timothy D. Baird (United States of America); Maria Eduarda Berenguer (Brazil); Cortni Borgerson (United States of America); Leah Bremer (University of Hawai'i); Emily Cadiz (University of Hawai'i); Lin Cassidy (Botswana); Nicole Crane (United States of America); Maral Dadvar (Islamic Republic of Iran); Matheus De Nardo (United States of America); Daniela del Bene (Italy); Elise Delgoulet (France); Marilou Demongeot (France); Cloé Dugrillon (France); Marta Echavarria (Colombia); Bram Edens (Netherlands); Harold Eyter (United States of America); Juan Felipe Ortiz-Riomalo (Colombia); Robert Y. Fidler (United States of America); Hamish Forbes (United Kingdom of Great Britain and Northern Ireland); Pınar Gerçek (Türkiye); David A. Gill (United States of America); Ellen Guimaraes (Brazil); Maureen Harris (Australia); Takashi Hayashi (Japan); Jun He (China); Emine Isciel (Norway); Usman Isyaku (Nigeria); Santiago Izquierdo-Tort (Mexico); Sue Jackson (Australia); Dheeraj Jayant (France); Laure Katz (United States of America); Joy Kumagai (United States of America/Germany) Jasper Kenter (Netherlands/United Kingdom of Great Britain and Northern Ireland); Fabian Keske (Germany); Michaela Kozmínová (Czech Republic); Marion Kruse (Germany); Natalie Kurashima (Kamehameha Schools); David Lansing (United States of America); Yann Laurans (France); Sophie Lavaud (France); Hortense Lecercle (France); Bosco Lliso (Spain); Jorge Llopis (Spain); Mika Marttunen (Finalnd); Michael B. Mascia (United States of America); J. Terrence McCabe (United States of America); Alice Millington (United Kingdom of Great Britain and Northern Ireland); Ana Sofia Monroy-Sais (Mexico); Deborah Moore (United States of America); Diana Paola Morales Lizarazo (Colombia); Maryury Mosquera-Palacios (Colombia); Rachel Neugarten (United States of America); Carl Obst (Australia/Institute for Development of Environmental-Economic Accounting); Zhiyun Ouyang (China); Ece Ozdemiroglu (United Kingdom of Great Britain and Northern Ireland); Fitry Pakiding (Indonesia); Mariana Perozzi (Brazil); Fernanda Ríos-Beltrán (Mexico); Justine Rives (France); Tatiana Roa-Avendaño (Colombia); Julian Rode (Germany); Brototi Roy (India); John Rulmal (Federated States of Micronesia); Geetanjoy Sahu (India); Fred Saunders (Sweden); Samantha Scholte (Netherlands); Elizabeth Shapiro-Garza (United States of America); Sushma Shrestha (United States of America); Laura Sotelo (Mexico); Hannah Kihalani Springer (Ka'ūpūlehu Marine Life Advisory Committee); Mette Termansen (Denmark); Fabian Thomas (Germany); Rob Tinch (Belgium); Jane Turpie (South Africa); Caroline Upton (United Kingdom of Great Britain and Northern Ireland); Mehana Vaughan (University of Hawai'i); Laura Veverka (United States of America); Anouck Waechter (France); Lei Wann (National Tropical Botanical Garden); Kawika Winter (University of Hawai'i); Supin Wongbusarakum; (United States of America); Emily Woodhouse (United Kingdom of Great Britain and Northern Ireland); Eglee Zent (Bolivarian Republic of Venezuela)

REVIEW EDITORS:
Juan Camilo Cárdenas (Colombia), Susan Baker (United Kingdom of Great Britain and Northern Ireland)

TECHNICAL SUPPORT UNIT:
Mariana Cantú-Fernández, David González-Jiménez

1. This is the final text version of Chapter 4.
2. Authors are listed with, in parentheses, their country or countries of citizenship, separated by a comma when they have more than one; and, following a slash, their country of affiliation, if different from that or those of their citizenship, or their organization if they belong to an international organization. The countries and organizations having nominated the experts are listed on the IPBES website (except for contributing authors who were not nominated).

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Annex 4.17 Uptake case #4: Values of nature in UK marine and coastal policy
Annex 4.18 Uptake case #5: Using multi-criteria decision analysis for collaborative development of a sustainable regulation policy for a large regulated lake, Finland
Annex 4.19 Uptake case #6. Uptake of non-market valuation through benefit transfer in cost-benefit assessments of United States federal regulation under the clean water act
Annex 4.20 Uptake case #7: Implementing gross ecosystem product (GEP) in Lishui, China

Chapter **4**

VALUE EXPRESSION IN DECISION-MAKING

EXECUTIVE SUMMARY

This chapter links diverse values of nature as communicated through different value articulation ("valuing" and valuation) processes to decision-making and its outcomes. It reviews the underlying causes of treating impacts on nature as external to, and ignored in, decisions by current political, economic and socio-cultural actors and institutions (i.e., conventions, norms and rules), and describes how on-the-ground drivers of nature's decline can be transformed towards recovery, focusing on land and sea use. The modalities and practice of explicit valuation of nature (preceding chapter) in support of decisions, and the decision-making processes themselves, may need to further evolve to achieve global sustainability goals, the CBD 2050 vision of living in harmony with nature and the recent Kunming Declaration of the CBD.

1 Decisions supporting the current drivers of unsustainable human appropriation of nature derive from values embedded in existing laws and other institutions; these values conflict with the full set of Sustainable Development Goals to address development deficits within planetary boundaries *(well established)* {4.2, 4.3}. Values associated with a wide range of societal and policy goals, including the values of nature, are embedded in legislation, policies, economic value chains and markets, but value conflicts and trade-offs are commonly encountered. Negative effects on nature and people are handled as externalities in the decision-making process {4.2.4}. Internalization of environmental externalities can be based on modified instrumental values and/or increased awareness and recognition of relational values as principles guiding people´s motivations to act in certain ways {4.2.2}. Despite public commitment to environmental and social causes, market values commonly prevail where economic trade-offs among competing goals cannot be avoided {4.3.2}.

2 The interaction of knowledge and power shapes the values held by social actors as well as how these values are articulated in specific decision-making processes *(well established)* {4.2, 4.3, 4.4, 4.5}. Power relations are relevant to all aspects of decision-making, beyond simply enabling some actors to influence which outcomes will be favoured. Power-knowledge interactions shape the decision-making context, rules and other aspects of institutions, and determine what types of knowledge are given credence in the decision-making process, influencing whether and how certain values are expressed and made legible to decision-makers {4.2, 4.4, 4.5}. Power relations among social actors not only influence which values are privileged over others or what information is available to decision-makers, they also determine what rules guide decision-making {4.3.2}.

3 While value-based intentions embedded in national biodiversity strategies and action plans have been internalized by many countries and a range of policy instruments included in the context of the CBD 2020 Aichi Targets have been implemented, limited progress has been made on the Aichi Goals A and B that deal with underlying causes of biodiversity loss and cross-sectoral power relations *(well established)* {4.3}. The reported achievement in aligning development pathways with the values of nature through the global 2020 biodiversity agenda has been higher for the targets that are typically within the mandate and resources of a ministry of environment (or its equivalent; Aichi C, D and E), than for targets that require cross-sectoral cooperation and co-investment (Aichi A and B; focused on such issues as reducing perverse subsidies for unsustainable production, pollution control and reorienting development projects) {4.3.1}. Progress on Aichi Target 2 on accounting systems through the recent adoption of United Nations System of Environmental Economic Accounting-Ecosystem Accounting (UN SEEA) standards will facilitate globally consistent ecosystem accounting and reporting on the contribution of ecosystem services to the economy {4.3.6}. Compliance mechanisms beyond good intentions are still lacking, however, and despite Aichi target 3 to abolish perverse economic incentives, these incentives still provide mixed messages to natural resource users in many countries {4.3.2}. Similarly, programs aimed at responsible production and consumption (aligned with SDG12) require managing competing values in decision-making processes, and a strategic approach to dealing with existing power asymmetries among stakeholders {4.3.3}.

4 Strengthening collective and customary territorial rights of IPLCs, beyond recognition and inclusion of their knowledge and valuation of nature, can yield substantial advantages for the protection of nature through local empowerment, transparency and accountability *(well established)* {4.4, 4.5}. Political empowerment of indigenous peoples and local

communities, allowing them to regain control of their land management and resources, can align the values of external programs with values and priorities expressed locally {4.4.2}. Given the exclusion of many communities dependent on ecosystems for their livelihood, being recognized in valuation and impact assessments of development projects or policies is not enough; empowerment requires that the rights and values of such stakeholders over existing natural resources and ecosystems are recognized in the law {4.5.5}. Negative outcomes and conflicts can arise and escalate from misalignment between the values embedded in the design of 'conservation' or 'sustainable development' programs and 'local values' the values of local people and communities that are affected by the decision, including those involved in customary land use {4.5.2, 4.5.3}. In contrast, when decision-making authority rests with local communities, protected areas management can lead to the creation of new institutions like tribal parks or indigenous and community conserved areas that further promote empowerment and social benefits as the link between values of nature and people {4.5.2}. The absence of such rights typically leads to unjust outcomes across conservation and development decisions {4.5.2, 4.5.3, 4.5.5}.

5 **Consumer dissatisfaction with the social and environmental values embodied in current trade, where it was expressed and led to pressure and self-regulation of global value chains, has made some, but limited, progress toward halting biodiversity loss and achieving fairer trade *(established, but incomplete)*** {4.3.3, 4.5.4}. Consumer concerns for sustainability and justice have triggered corporate responses to change production practices (such as 'deforestation-free' claims), which can transform production systems more rapidly than public sector engagement within world trade institutions {4.3.3}. Farmer-level incentives for environmentally sustainable and socially responsible production systems are often insufficient, given the high costs for certification and transparency mechanisms, especially for small-scale farmers {4.3.3}. Positive environmental and social outcomes for sustainability certification across more of the production system may require public sector-led involvement enabling transparency of monitoring and reporting systems by civil society {4.5.4}. Effective implementation of sustainability certification programs implies aligning international standards to local values and conditions and establishing mechanisms for verified sourcing integrated into public-sector development planning {4.5.4}.

6 **In designing economic incentive policies for nature and nature's contributions to people, incorporating stakeholder values can reinforce rather than undermine motivations for environmental stewardship *(established but incomplete)*** {4.3.4}. Economic incentives such as payment for ecosystem services programs can unintentionally affect people's existing motivations for nature conservation and environmental stewardship, in positive or negative ways, known as "crowding in" or "crowding out", respectively. Anticipating and avoiding such effects can improve policy design and its communication but requires understanding of the conditions under which these effects emerge, in a social-cultural context. Current literature provides some guidance, but still has limited predictive ability on the crowding effects {4.3.4}. Similarly, market-based initiatives, such as sustainability certification, designed at international scales and not adapted to the local context can exclude local management practices and increase inequalities among stakeholders {4.5.4}.

7 **Enhancing meaningful involvement of local actors in decision processes regarding the management of natural resources and the design and implementation of policy instruments increases the recognition and prioritization of the diversity of local values. Participatory processes in decision-making are more likely to lead to more sustainable and just outcomes concerning the use, conversion or conservation of nature *(established but incomplete)*** {4.5}. In protected areas, deep community involvement and institutional capacity for collaborative governance that allows for prioritization of local values (including instrumental and relational values) aligned with sustainable use promotes positive social and environmental outcomes, including reduced poverty, increased forest cover, enhanced fish stocks, and greater biodiversity {4.5.2}. Likewise, recognizing and respecting values of affected people in voluntary programs like payment for ecosystem services and sustainability certification can improve outcomes of the program, principally by affecting participation levels and program sustainability {4.5.3} and increasing financial and technical capacity of program participants {4.5.4}. Improvements in procedural justice are often associated with improved distributional justice and recognition, which often lead to greater public support for conservation programs, and in turn better prospects for their sustainability {4.5.2, 4.5.3, 4.5.4}, though formal evaluations of interactions between outcomes are scarce and more diverse metrics to represent different social and environmental outcomes (beyond poverty and habitat extent) are needed {4.7}. For large infrastructure projects, procedural justice can be (but very rarely is) manifested in terms of statutory representation for indigenous peoples and local communities in final decision-making, while distributive justice can be addressed through flexibility regarding size and siting of projects, mitigation measures, and improved benefit-sharing, including profit-sharing, which all contribute to better balancing between instrumental values for local livelihoods or larger scale developmental benefits and intrinsic or relational values for nature {4.5.5}. In all cases, increasing what appears to be "participation" through

cursory or coercive involvement of local actors is not sufficient and may even be detrimental to both social and environmental outcomes; contextually-appropriate safeguards for the legitimate participation in the decision process by people living closer to and being more dependent on ecosystems are critical for balancing the diverse values held by stakeholders and ensuring positive outcomes for nature and people {4.5.2, 4.5.3, 4.5.5}.

8 **Socio-environmental conflicts, resulting from lack of recognition of the diverse values held by different stakeholders, procedural injustices in the decision process, and perceived or anticipated distributional injustices in decision outcomes, can undermine the effectiveness of policy interventions *(established but incomplete)*** {4.5}. Socio-environmental conflicts arise from clashes of values and power asymmetries among different groups: within local communities, between local communities and external actors (outside the local community), and among different scales of governance (e.g., local and national). Such conflicts often result from decisions that impact the local environment, and which do not consider the unequal distribution of burdens due to degradation of ecosystems and exclude the values of local people who are in direct connection with local nature {4.5.2, 4.5.3, 4.5.5}. Prolonged conflicts over large infrastructure development projects, for example, often result in repressive measures from the state, furthering perceptions of environmental injustice from locally affected communities {4.5.5}. Similarly, exclusion of local values in the establishment of protected areas can leave a legacy of mistrust or resentment that is difficult to repair, even with transitions to more community-based co-management approaches {4.5.2}. Misalignment between the values built into voluntary programmes like payment for ecosystem services and certification programmes and the values of local communities can provoke local protest and even sabotage, jeopardizing programme's outcomes over time {4.5.3, 4.5.4}. However, conflict can also provide leverage for needed change, and knowledge gaps exist about the role of conflict in transformation of values {4.7}.

9 **Valuation of nature has the potential to inform, to support decision-making and policy design at different stages of the policy cycle, at different levels of environmental governance *(established but incomplete)*** {4.6.3, 4.6.6}. Valuation of nature can be used to inform agendas and support commitment to agreed policy goals {4.6.3, 4.6.6}. Indigenous and local knowledge can support determination of rights by the judiciary e.g., nature as a subject of rights *such as* the law of Mother Earth {4.4.2, 4.6.5, 4.6.6}. Valuation can provide technical support for policy formulation and design, for example helping to achieve agreement on the types of policy alternatives under consideration, to determine voluntary incentives (e.g., levels of payment for ecosystem services), and to co-design and co-manage protected areas with different social groups {4.6.3, 4.6.6}. Valuation can be used for decisive purposes by supporting decisions for policy adoption and helping reach agreements about the means of policy implementation {4.6.3, 4.6.6}. Valuation can support in-course adjustments to implementation measures, or justification for continued budget allocations {4.6.3, 4.6.6}. In addition, the use of valuation methods can also provide agreed means of retrospective policy evaluation – when applied in the context of impact evaluation or natural capital accounting, valuation can also provide key ex-post information on the effectiveness of implementation and achievement of policy goals {4.6.3, 4.6.6}. Such ex-post applications of evaluation methods also serve the purpose of method development for researchers since they provide the opportunity to compare ex-ante and ex-post evaluation processes, and as such, the ability to test the effectiveness of methods used. Completing the policy cycle, valuation can contribute to renewed agenda setting and the development of new policies or projects to address emerging sustainability issues {4.6.3, 4.6.6}.

10 **A large body of knowledge has been developed on methods for valuation of nature and nature's contributions to people, but there has been limited documented uptake of valuation methods to support public policy decisions at different scales *(well established)*** {4.6.3, 4.6.4}. Guidance documents, valuation databases and standards provide ample resources and expectations for valuation results to support decision-making across a number of sectors and governance levels. Valuation research has produced a large body of knowledge developing explicit valuation methods and valuation results {4.6.2}. Yet, scientific literature for the period 1990-2020 reports uptake of this valuation knowledge in decision-making in less than 5% of published studies {4.6.3}. While the proportion of valuation studies making cursory reference to uptake has increased since the 1990s, documented uptake has not increased. Studies with a decisive or technical policy design purpose are somewhat more likely to document uptake than studies for informative purposes {4.6.3}. Economic valuation methods are only slightly more likely to document uptake than non-economic valuation methods {4.6.3}. The lack of documented uptake does not match expectations created by the exponential growth of the peer reviewed valuation literature {4.6.3}. Documentation of valuation of biodiversity in national biodiversity strategies and action plans is incomplete in most countries. While a number of countries report on uptake of valuation {4.3.5, 4.6.4}, many countries' national reporting on Aichi target 2 does not reflect actual valuation and accounting taking place {4.6.4}.

11 **Standardization of valuation can increase the level of reliability and uptake of natural capital accounting into national-level policies *(established but***

incomplete) {4.3.5, 4.6.4, 4.7}. Natural capital accounting aims to assess nature's contributions to national economies in standardized ways that allow for comparisons across countries and through time. The United Nations System of Environmental and Economic Accounts – Experimental Ecosystem Accounts (UN SEEA-EEA), provides an international statistical standard to guide the integration of largely unaccounted biophysical values of ecosystem services in national accounts. Many countries are pilot testing or starting to undertake ecosystem accounts {4.6.4}. The spatial and biophysical foundation of this more recent ecosystem accounting approach has the potential to inform (sub)national and local stakeholders and their decision-making needs, such as in land-use planning {4.6.4}. National accounts aggregate values at national level, which facilitate comparisons across time, countries, and sectors of the economy, but standardization at national level can come at the expense of not identifying some ecosystem service values at local level {4.3.5, 4.6.4}. Further research is needed on the valuation methods to account for values of ecosystem services for the purposes of national accounts {4.6.4, 4.7}.

12 Analyses of the barriers to uptake of valuation in public decision-making have focused on method quality issues, but understanding is limited concerning the role of power *(well established)*. Power dynamics and actors' capacity to broker knowledge associated with valuation represents both a potential for, or barrier to, valuation uptake in the policy cycle *(established, but incomplete)* {4.5, 4.6.2, 4.7}. Barriers to uptake of valuation in public decision-making have been attributed to the quality of valuation studies (recognition, procedural justice, reliability and validity) and to a lack of policy alignment between political jurisdictions, administrative levels and sectors. Barriers to uptake can also derive from a lack of timeliness of results, or lacking salience, credibility, legitimacy, and process documentation in the valuation process; it can also be due to the excessive cost and capacity requirements of plural valuation studies {4.6.2}. A number of best-practice valuation uptake cases demonstrate that overcoming these barriers to valuation uptake is possible, but rare {4.6.6}. The selective commissioning of valuation and emphasis on certain values by powerful stakeholders in policies, plans and their implementation is often to the detriment of marginalised stakeholders, their local knowledge systems and their worldviews {4.5.2, 4.5.3, 4.5.5}. The role of power in selective uptake of valuation in policy continues to be a blindspot in the valuation literature {4.6.2, 4.7}.

13 Valuation is more likely to overcome barriers to uptake throughout the policy cycle, if it is used to represent specific actors' interests and responds to their knowledge needs *(established but incomplete)* {4.6.6, 4.7}. To improve uptake of valuation in decisions, valuation practitioners can move away from assumptions that the results from valuation studies will influence general public policy discourse and undertake more –specific valuation studies that clearly define their policy purpose. Valuation commissioners can improve specification of the purposes of valuation in the terms of reference for valuation studies, lower valuation costs by standardization of or best-practice guidance on methods, and increase relevance and robustness by funding valuation exercises regularly throughout the policy cycle. Publicly funded valuation research can improve targeting of knowledge gaps in the use of explicit valuation for policy support over time {4.7}.

4.1 INTRODUCTION

4.1.1 Aims of the chapter

Chapter 4 of the *values assessment* addresses:

i. *The diverse conceptualization of values of nature and its benefits.* Specifically, this chapter examines the role of diverse values and valuation approaches in public decisions on *'institutions and governance'* that are at the centre of the IPBES conceptual framework. Values are embedded in the institutional and economic drivers of the global production system, which are the main indirect drivers of biodiversity loss. Assessing these values not directly related to nature is outside the scope of this assessment, but the chapter provides examples of how the current poor representation of values of nature, embedded in legislation and trade regulations, cause ecosystem degradation.

Figure 4.1 shows the relationship between the diverse values of nature and the way values are articulated (arrow 1) and how this is linked to decisions (arrow 2) but modified by power (arrow 3A) and knowledge (arrow 4A; including diverse knowledge systems such as scientific, local and indigenous knowledge) and their interactions with values held and values articulated (arrows 3B-3D and 4B-4D). Decision-making occurs through the creation and reform of institutions (conventions, norms and rules), and within the mandates of existing institutions, in a multi-phased process (a "policy issue cycle", shown as the spiral on the right side of **Figure 4.1**), with different entry points for value articulation (expression). Such decisions lead to outcomes (arrow 5) for well-being, equity and sustainability, that themselves interact with nature (arrow 6A), knowledge (learning; arrow 6B), power (determining winner and losers; arrow 6D) and the ways values are expressed publicly (arrow 6C). The complexity of these multiple feedback loops challenges the conceptual simplicity of expectations that better ways of articulating nature's values (arrow 1; through informal 'valuing' or more formal 'valuation' methods, as

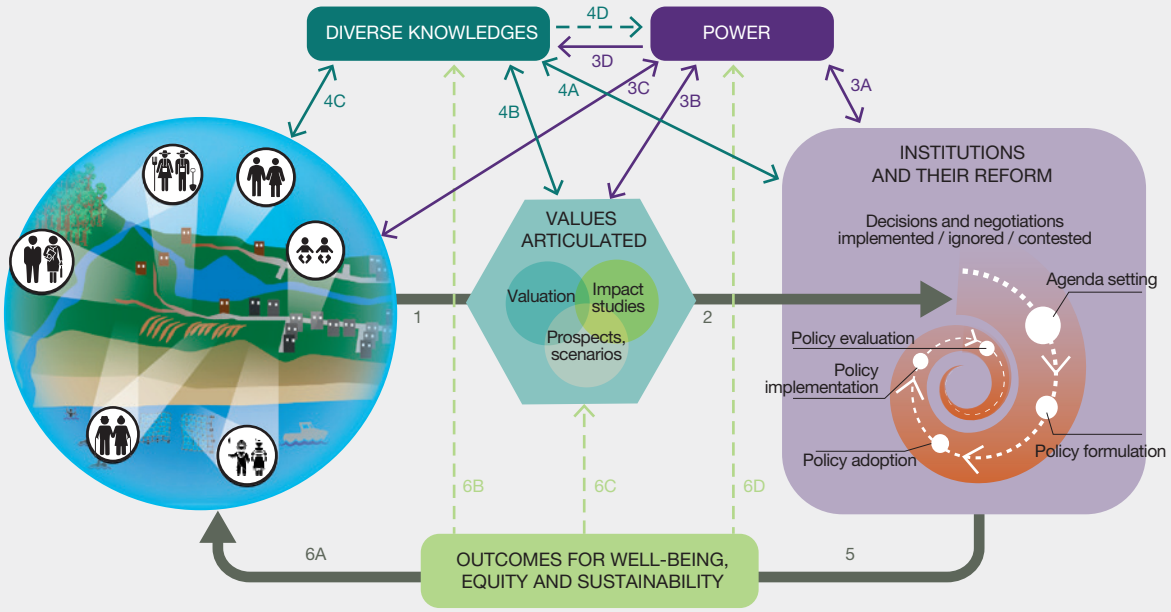

Figure 4 1 **Value articulation (through informal 'valuing' or formal 'valuation') as the link between values held across diverse people, and institutions and decisions, that lead to outcomes for well-being, equity and sustainability, is strongly influenced by power and knowledge.**

This chapter explores the complexity of these relationships (arrows) between values, institutions, power, knowledge, and outcomes in decision-making.

described in Chapter 3) alone will lead to better decisions and outcomes for people and nature, or at least have direct leverage on policy and societal change.

ii. *The diverse valuation methodologies and approaches.* This chapter evaluates the extent to which valuation methods and approaches have been designed and carried out for policy and decision-support purposes (arrows 1 and 2 in **Figure 4.1**). It builds on the methods typology of Chapter 3 and its overview of the most commonly used valuation methods, as well as their characteristics, including how they address different social and societal values.

iii. *The different approaches that acknowledge, bridge and integrate the diverse values and valuation methodologies for policy and decision-making support.* This chapter evaluates the evidence of implicit valuing of nature and its contributions to people, manifested through the decisions made tacitly or explicitly within different institutions and governance regimes, across policy cycles. It also examines how values are integrated into decision-making processes resulting in different outcomes of decisions regarding, e.g., protected areas, payments for ecosystem services, sustainability certification and infrastructure development. This culminates in an assessment of the evidence for actual uptake (and barrier to uptake) of formal valuation in policy and decision-support.

iv. *Knowledge and data gaps and uncertainties.* The chapter assesses the role of power in determining uptake of valuation, and the outcomes of value conflicts between interests in decision processes. In section 4.7, knowledge gaps that limit the bridging and bringing together of diverse voices in decision-making and policy, are identified. The role of power relations in determining knowledge gaps and the uncertainty due to dynamics of decision-making runs through the evaluation of the evidence in all sections.

4.1.2 Chapter outline

Section 4.2 posits that the more values taken into account, the more complex decision-making becomes. Aspects that matter to the decision-maker are typically prioritized over externalities. Negative impacts on environmental quality, ignored as externalities by decision-makers may lead to conflicts between stakeholders. Values expressed by other stakeholders could matter to a decision-maker because (i) the people expressing those values matter to the decision-maker, (ii) the arguments as such may be convincing, or (iii) both (see 4.2.1). Even if valuation makes externalities

an explicit consideration of decision-makers (see 4.2.2), trade-offs are to be made – often in a stepwise progression from ignorance, denial, conspiracy theories towards shared understanding, common goals and fairly distributed responsibility for means of implementation. These steps are understood as "issue cycles" (see 4.2.3), traced through the example of balancing different goals formulated for the 2030 Agenda for Sustainable Development (see 4.2.4)

Section 4.3 considers how, across scales, existing institutions (conventions, norms and rules) and decisions reflect the values (arrows 1-2 in **Figure 4.1**), power (arrows 3) and knowledge (arrows 4) that shaped them. At global scale, decisions concerning both incremental (small-scale, short-term) and potentially transformative change were embraced in the Aichi 2020 biodiversity targets (see 4.3.1). However, within national jurisdictions court cases challenge the interpretation of existing legislation where drivers of business-as-usual decisions about mining, large infrastructure and global trade intersect with values of nature and impacts on local people (see 4.3.2). At the individual scale, an increasing share of consumers internalize and take responsibility for their environmental footprints, and put pressure on the private sector. This has, in a growing number of commodities, led to voluntary certification responses but perspectives on their effectiveness are diverse (see 4.3.3). Policies such as payments for ecosystem services are designed to financially internalize externalities of environmental stewardship not appreciated by current market prices; however, they can have unexpected effects on existing motivations to act in different ways by people (see 4.3.4). National reports on meeting the Aichi commitments to reduce perverse subsidies for land use that damages nature, and to ensure that national accounting systems include the externalities of national development policies show that progress on those targets has been limited (see 4.3.5).

Section 4.4 analyses how values of nature are expressed and taken into account in decision-making processes in multicultural and intercultural rural territories. Three cases are used to highlight how the diversity of values of nature are included in the decision-making process in different geographies and how knowledge and power relations influence the decisions to consider the diverse values of Indigenous Peoples and Local Communities (IPLCs). The case of governance institutions in the Amazon (see 4.4.2) illustrates how values of nature taken into account in the decision-making process change through time, subject to contradictions and conflicts between the national economic goals, the conservation of the rainforest, and the well-being of IPLCs. In contrast, the examination of research of protected spaces, including indigenous community conserved areas and cultural landscapes (see 4.4.3), shows the continuity of values when the IPLCs have security and autonomy over their territories. Finally, the conservation and sustainable use of agrobiodiversity (see 4.4.4) implies diverse and even contrasting values of agrobiodiversity that come into tension in the decision-making processes between various actors implied in the agricultural sector.

Section 4.5 examines how values (**Figure 4.1**, arrow 2), along with knowledge (arrows 4) and power (arrow 3), influence decisions that lead to social and environmental outcomes (arrows 5 and 6), feeding back to knowledge and power (arrows 6B and 6D). This process is examined in four different decision contexts spanning the range of human interactions with nature: protected areas (see 4.5.2), payments for ecosystem services (see 4.5.3), commodity sustainability certification programs (see 4.5.4), and large development projects such as mining and dams (see 4.5.5). Literature reviews of systematic reviews as well as in-depth case studies provide robust evidence to evaluate under which conditions diverse values lead to more sustainable and just outcomes of decisions.

Section 4.6 reviews evidence that valuation methods (as described in Chapter 3) are being used by stakeholders for different purposes in the policy cycle (**Figure 4.1**, arrow 2). An analytical framework describes barriers to and criteria for uptake of valuation in the policy cycle, due amongst others to power brokerage (arrow 3A), robustness of valuation knowledge (arrow 4A) and the way valuation is articulated publicly by methods (arrow 4B; see 4.6.2). A systematic review of published research focused on the valuation of nature's contributions to people, including ecosystem services, finds continuing research blindspots regarding documentation of stakeholder uptake (see 4.6.3). Only part of documented uptake of valuation scientific publications coincides with national reporting on valuation practice and ecosystem accounting (see 4.6.4). The potential for uptake of local and indigenous valuation knowledge in policy plans is reviewed and exemplified (see 4.6.5). Finally, the section showcases seven case studies demonstrating how barriers to valuation uptake can be overcome for a range of methods addressing stakeholder needs at different governance scales and policy cycle stages (see 4.6.6).

Section 4.7 summarizes critical knowledge gaps identified in the preceding sections and discusses ways forward to support decision-making through value articulation.

4.2 VALUATION OF NATURE: RELEVANT BUT INSUFFICIENT FOR PUBLIC POLICY DECISIONS

4.2.1 Relevant but insufficient

The often-implicit expectation that valuation will appeal to all involved in decision-making and improve decision making through a common understanding of implications of alternative choices (arrows 1 and 2 in **Figure 4.1**), refers to a rationally economic, instrumental worldview. This ignores the reality of power differences (Juerges *et al.*, 2021) and plurality of knowledge. A large empirical body of literature focuses on the *bounded* rationality of actual human decision-making (Kahneman, 2011; Thaler, 2015; Welch, 2020). The alternative, political, interpretation that participation in decision-making is a social process and open to influencers, status and power relations is generally accepted. Current concepts of "relational values" and "sociality" (Fiske, 1992; Hofstede, 2019) articulate what the bounds to rationality are: human decisions relate to reference groups, rituals, affiliation, status and power; they include "eudaimonic" as well as hedonic concepts of human well-being in a context of cultural diversity (see Chapter 2), and are open to articulations of relational values of nature. These articulations commonly use metaphors and language also used to describe human-to-human relations. Human openness to "influencers" is exploited by active misinformation campaigns and conspiracy theories protecting interests of those resisting change (van Noordwijk, 2019). Beyond value articulation throughout the public decision-making cycles, at least four other elements (voice, vote, violated rights and laws, and invoices paid) contribute to public decisions and their effectiveness (Cashmore *et al.*, 2010; Elling, 2012; Glucker *et al.*, 2013). While most of these aspects are outside of the scope of this *values assessment*, they are considered to be the *context* in which efforts to value nature are more, or less, effective. They may also contribute to the limited incidence of explicit valuation in various political and social contexts discussed in section 4.6. Hence, valuation of nature (in the plural sense of Chapter 3) is relevant but insufficient to enable public decisions within social and environmental policy mandates.

The relative influence of the rationality (benefit-based) and sociality (relationship-based) sides of decision-making on public policy is poorly understood (Hofstede, 2019), but likely has consequences for the way valuation studies can be designed, executed and communicated (van Noordwijk, 2019, 2021). Beyond the content and conclusions of valuation studies, the way results are communicated, the legitimacy and status of the people communicating is, an often undocumented, part of the relevance of valuation. In the sociality perspective on decision-making, decisions still need a *post-hoc* rationalization in terms of values for external communication. Deliberate use of attractively sounding values as a coverup (greenwashing) for resisting change, can remain part of the public negotiation process until it is exposed as such.

In trying to understand the role of institutions ('rules in use') in constraining and modifying individual decisions, the rise and fall of specific institutions can be related to the way they function. Two broad categories of public decisions are "constitutional" and "allocational" (Ostrom, 1990). The first, politically, shape institutions (or policy instruments), including those for commons and for defining boundary conditions to, and interacting with private (and corporate) decisions. The second type, economically, uses institutions to modify benefit distribution within existing mandates. Jointly these processes and their outcomes define *governability, 'as a balance between the ambitions of all stakeholders and what can be operationalized*' (Kooiman *et al.*, 2008).

Public policy decisions interact with and modify the boundaries (rules and rights, incentives, motivation) that enable decision-makers to internalize at least part of the externalities they produce in their current decisions, but they are themselves challenged, modified and shaped by societal (including political) processes **(Figure 4.2)**. They typically combine rules, incentives, and motivation in "policy instruments" (Persson, 2006) that interact with private and civil society decision-makers and aim to induce desired behaviour. As influences on public decisions, current values of nature complement the understanding of past and current human impacts on nature (IPBES, 2018a, 2018b, 2018c, 2018d, 2019a) and the expected consequences (prospects) of future scenarios (IPBES, 2016a). Jointly the past, present and future inform the rationality and knowledge base of human decisions **(Figure 4.2)**, but if conveyed by respected voices, also their sociality.

Issues of concern arise across the gradients of land use (from wilderness to urban) and sea use intensity (from coastal zones to open oceans) and their teleconnections that shape life on land and life in water. These gradients determine where the top five direct drivers of biodiversity loss (as ranked by IPBES (2019): habitat loss, over-use, invasives, pollution, and the causation of climate change) are located. They also suggest that development deficits (SDG 1-11) are linked to geographic areas where existing conservation efforts are concentrated. In this section current understanding of the processes involved in public decision-making is reviewed in response to issues of concern that relate humans to nature. The formulation of goals (such as SDGs) is a major steppingstone in the processes of change that connect global impacts to local actions, by clarifying externalities of past decisions.

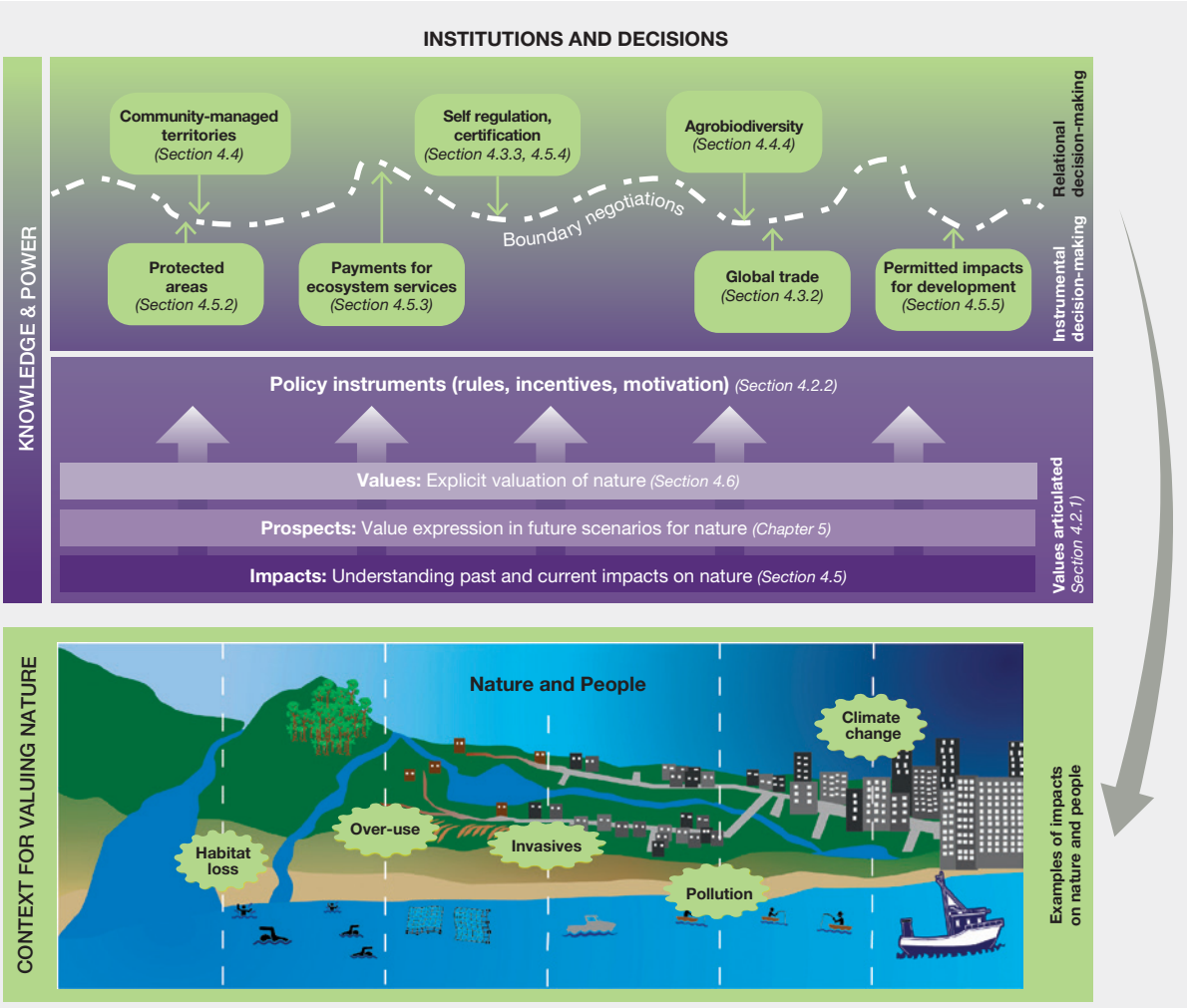

Figure 4 2 **Gradients of land and sea use intensities (lower panel), respond to and impact issues of concern, including the five main drivers of biodiversity loss; Knowledge of the impacts, values at risk and prospects in future scenarios inform political, economic and societal decision and negotiation processes (upper panel); some of the specific policy instruments discussed in this chapter are positioned in the gradient and evaluated for social and environmental outcomes.**

4.2.2 Internalizing externalities

Some values and expected impacts of decisions are considered important, others not. These latter, known as 'externalities', are of two types: unforeseen social or environmental impacts, and foreseen impacts beyond the group decision-makers care about. Decision-makers care about expected impacts on their social group (known as 'in-group' in social and social psychology literature; Aronson *et al.*, 1994), often with family at its core, but extending to friends, clan, tribe, ethnicity, class, generation or other social stratifiers depending on cultural context (Hofstede, 2019). For the first category of externalities efforts to better inform decision-makers of likely impacts and values potentially affected can help; for the second, the underlying values of decision-makers on who and what they themselves care about will have to change before decision-making will change.

Instrumental values of nature that express how nature-based solutions support human goals are challenging the 'rationality' of ignoring human impacts on nature, while relational values address the way in-groups are perceived. Internalization means bringing values into the inner spheres of decision-making, at the interface of rationality and sociality. The most common interpretation of internalization only refers to one of the three basic policy instruments: incentives, rules, and motivation (Bemelmans-Videc *et al.*, 1998). It can, however, take different forms (van Noordwijk *et al.*, 2012):

- Rules that regulate human activity, making environmental impacts subject to permits and prior assessments, often made politically palatable by compensating for previous, implicit or explicit, rights to pollute or over-use of resources,

- Incentive structures modified as in payments for ecosystem services programs and pollution charges, but also changing co-investment regimes, expressing shared public-private responsibility and risk management,

- Accountability for side-effects (linked to "duty of care", "due diligence" concepts), with social and financial consequences, and threats of legal prosecution; and related to that, creating moral accountability for footprints, e.g., through (threats of) consumer boycotts, political demonstrations or other forms of protest, and standards for free, prior and informed consent by local stakeholders,

- Changing the boundaries of what is perceived as in-group to include (parts of) nature; for example, early-age environmental education influences emotional aspects of motivation; most languages differentiated between 'friends' and 'enemies' among plant and animal species and the associated terms may need to be challenged early on.

These different pathways to internalization of externalities can rely on implicit and explicit values and valuation, in the context of local knowledge and power dynamics (van Noordwijk, 2021). As analysed by Chapman *et al.* (2020), the apparent success of a policy instrument such as payment for ecosystem services in Costa Rica can be due to "optimal ambiguity", that allows interpretation and rationalization to differ between high-level policy discourse (market-based instruments) and its interpretation on the ground (public co-investment in local stewardship), crossing over between payment for ecosystem services paradigms (Leimona *et al.*, 2018; Shapiro-Garza *et al.*, 2020; van Noordwijk *et al.*, 2012) implemented as a policy mix (Barton *et al.*, 2017). Annex 4.1 provides an example of how in Indonesia a phase of violent conflicts was transformed by a combination of rule-, incentive- and motivation-based approaches to internalization in a single landscape.

4.2.3 Multi-scale, sequential political decision-making processes

Public governance decisions can allocate resources (land use rights or budgets, for example), change the rules governing specific activities (such as permitted uses of biocides), or set generic incentives (including subsidies or performance-based payment for ecosystem services). Most decisions impacting nature involve local-to-global scales, with the higher levels defining the boundary conditions within which lower levels can fine-tune decisions, within the trade-offs relevant at each scale. In line with the subsidiarity principle (Carozza, 2003; Vischer, 2001; Wanzenböck & Frenken, 2020), constitutional and allocational decisions start with a choice to make a decision, delegate to higher or lower levels of authority, or delay for further analysis and consultations. For example, the Aichi targets (or the next set of CBD targets), negotiated in international fora, may represent a country's level of ambition for the amount of their land placed under environmental protection; the (allocational) designation of specific areas as a national park (or other protected area category) may then be identified and allowed resource uses within its boundaries determined at the national scale; yet day-to-day management decisions, consultation with local communities (or not), and implementation strategies are conducted at a local scale. It is these continual and evolving local decisions that ultimately determine the success of the protected area in achieving its desired aims.

Political decision-making is understood as a process where political and public actors interact with the private sector, civil society/local actors, or (often) both. Decision-makers respond to continuously emerging "issues of concern" in an issue attention or policy cycle (Downs, 1972; Jann & Wegrich, 2007; Peters & Hogwood, 1985; Tomich *et al.*, 2004). **Figure 4.3** shows that the issue cycle involves many types of decisions. Some issues get accepted as part of the agenda (decision I), and after analysis get sufficient traction (decision II) to lead to revisiting and reframing of goals (decision III), to the acceptance of these goals (decision IV) and formation of new institutions (constitutional rules of the game, policy instruments) with delegated authority and budget (decision V) to implement these rules (decisions VI), inducing further responses by other actors (decisions VI).

4.2.4 Incremental and transformative change

Decisions can be classified in many ways, including but not restricted to the typology presented in Chapters 1 and 2. Ostrom (2005) identified seven types of constitutional decisions that define the boundary, payoff, position, choice, scope, information, and aggregation of allocational (economic) "rules in use" by any institution. Payoff rules determine if, and if so what, valuation methods are deemed valid knowledge about the costs and benefits of actions. Other rules in use determine the context of action situations, and implicitly value outcomes of those actions. Valuation as "boundary work" at the science-policy interface (Cash *et al.*, 2003; Clark *et al.*, 2016), tries to match the supply of and demand for knowledge of values of nature in both types of decisions. In the relationship between constitutional plus allocational

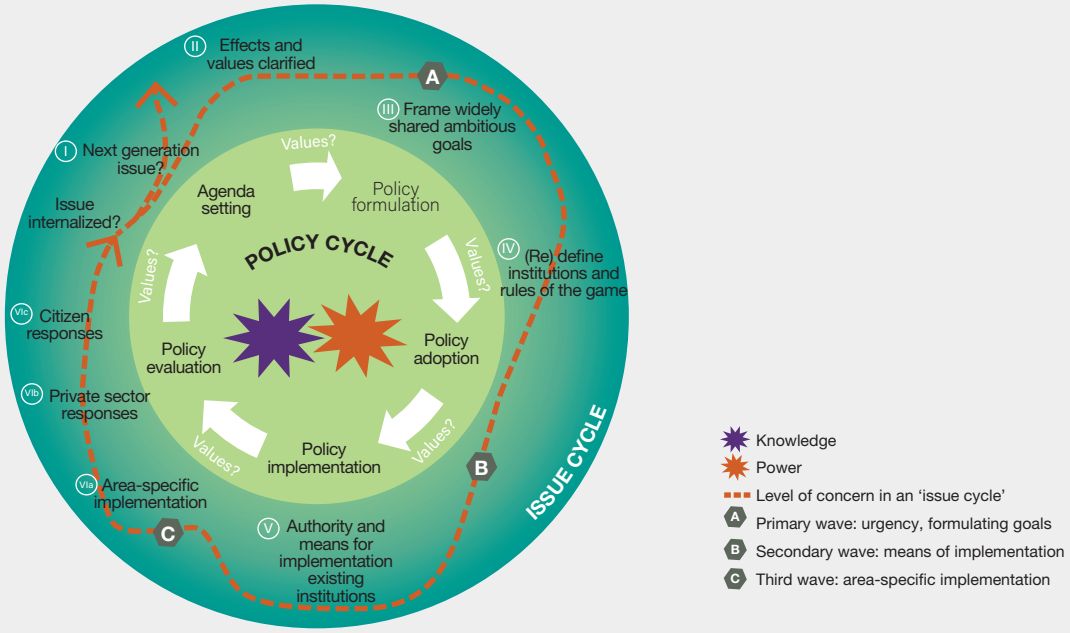

Figure 4 3 **Schematic representation in the inner circle of stages in a policy cycle and the public (political), private (economic) and civil society (socio-cultural) decisions (I – VI) that drive the outer circle of issue cycles.**

With various entry points for value articulation; three waves of increased public concern and political pressure are indicated.

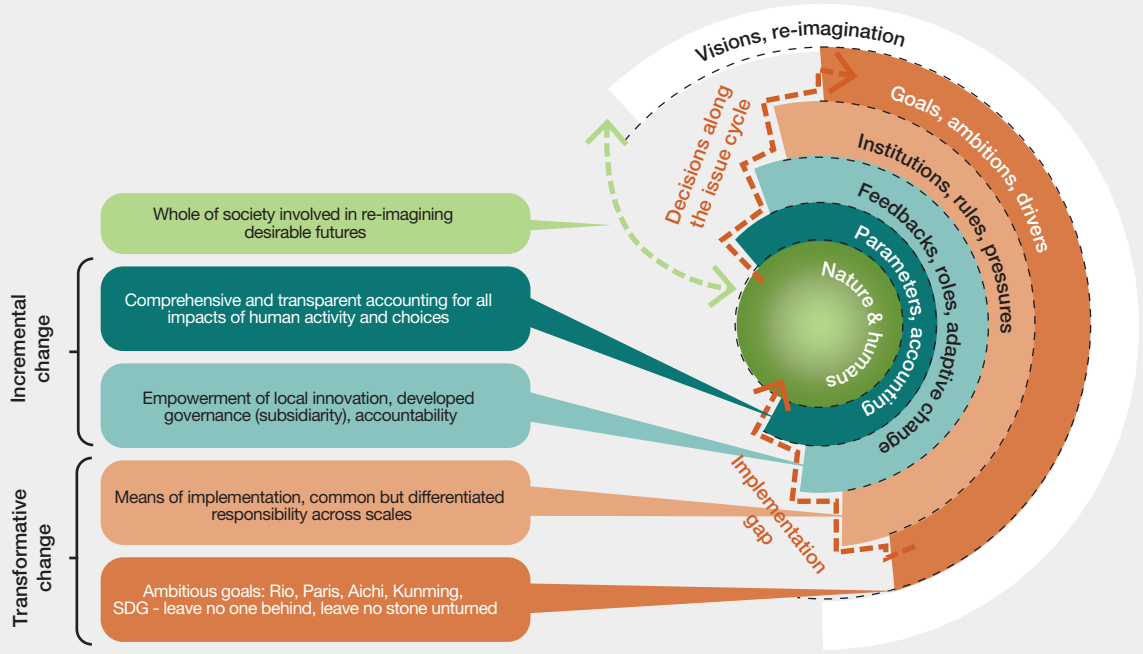

Figure 4 4 **Overview of decisions that are part of issue cycles (upwards from data towards goals) and can help resolve issues of concern in the public policy sphere, progressing towards stronger leverage (*sensu* Meadows, 1999) and reduce the implementation gaps for broadly accepted goals that need to have means of implementation, accountability and accounting attached to them**

decisions and specific values of nature (i.e., instrumental, relational and intrinsic values), four interconnected levels need to be mentioned (Meadows, 1999):

- *Parameters* (or *data*), where metrics, parameters, expected (discounted) costs and benefits associated with quantified instrumental values interact with explicit, often binary, decisions to accept or not accept proposed projects;
- *Feedbacks,* where values of reduced riskiness of investment, potential social pay-offs, reciprocity and status indicators, interact with efficiency-oriented decisions on roles, cost and benefit allocation among multiple actors, with attention to implementation and transaction costs,
- *Institutions,* where aspects such as recognition, stewardship, eudaimonia, group (club) membership, and avoiding conflict, interact with constitutional (effectiveness) decisions about rules of the game, boundaries to rights, in-group membership/exclusion and security (risk sharing) in determining how and which values are included in decisions
- *Goals,* where invaluable, non-negotiable held values of respect, identity-related self-expression, ethics, and sovereignty/autonomy concepts such as free and prior informed consent, interact with equity decisions on universal goals, ways to internalize externalities, intergenerational responsibility and ensure continuity.

Mismatches may arise if valuation does not align with what is at stake in specific decisions. The issue cycle in **Figure 4.3** suggests that public debate on issues may need to proceed to the fourth level (goals) before identifying "on the ground" solutions in decision making processes **(Figure 4.4)**. Yet, once goals have been agreed on, the steps towards means on implementation, empowerment of implementers and accountability have to be followed, to avoid so-called implementation gaps. Processes that only influence the first two layers may be described as "incremental change", processes that reformulate goals and institutions have the potential to induce "transformative change" — at least if the implementation gap is addressed.

When an issue cycle has led to the formulation and acceptance of goals, the initial proponents may still primarily express the relational and/or intrinsic values behind these goals, but the goals and the costs of achieving them turn to be articulated as instrumental values. Where the goals have achieved legal status, the threat of litigation can add strength to efforts to achieve them. Annex 4.2 reviews the multi-layered decision-making in a European country around restricting atmospheric nitrogen emissions from agriculture, traffic, and industry responded to and transformed values and required decisions by the country's highest court to force the political sphere to deliver more than words and promises.

4.3 POLICY INSTRUMENTS, VALUES, DECISIONS AND POWER

4.3.1 Public policy instruments in the Convention on Biological Diversity

Existing institutions reveal the history and path-dependency of the forces that shaped them, as well as the modifications and adaptations that they accumulated over time (Bateman & Mace, 2020; Baumol *et al.*, 1988; Freeman III *et al.*, 2014). For example, the Aichi targets represent institutional history. Global participation in the Convention on Biological Diversity (CBD) demonstrates that environmental issues have gained recognition as sectors of society, with budgets, space, and government institutions dedicated to ambitious goals formulated. Reaching these goals, however, requires change beyond the mandate of specific Ministries and involves trade-offs with other, valued, sectors of society, including those providing health, food, water, and energy, overcoming the implementation and compliance gaps (Buchanan *et al.*, 2020; Butchart *et al.*, 2016; Tittensor *et al.*, 2014). The five objectives that guide the 20 Aichi targets for 2020 of the CBD are constructed along a driver-pressures-system state-impacts-responses framing in five strategic goals **(Table 4.1)**.

The reported achievement of Aichi targets by 2020 (SCBD, 2020) has been higher for targets 11-20 (Goals C-E), typically within the mandate and resources of a Ministry of Environment than for targets in objectives A and B, such as pollution control and reorienting development projects that directly interact with mainstream business-as-usual economic development and its fiscal policies, requiring cross-sectoral cooperation and co-investment. Target 11, increasing the space for protected areas had the highest reported success, controlling pollution (target 8), the lowest **(Figure 4.5)**.

The targets differ in institutional translation. Some targets are claiming a considerable part of planetary space (so-called "conservation grabs"; Holmes, 2014; Lunstrum, 2016), implying conflicts over rights, values and livelihoods of local communities (Büscher *et al.*, 2017; Kopnina *et al.*, 2018). Beyond values of nature, these deal with trade-offs with other quality of life aspects. Targets more directly in the mandate of ministries of environment (or their equivalents in national contexts) may be constrained by budgets (and thus bargaining power in political realms) rather than conflicts with other national priorities, as reflected in the full set of 17 SDGs. The language of nature-based solutions aims to broaden coalitions.

Where institutions fail to effectively address the issues for which they were created it may be a path of lower resistance

Table 4.1 **Aichi goals and targets, examples of policy instruments used to achieve them and interacting SDGs.**

E = Economic, P = Public policy (political), S = Social-cultural.

Aichi CBD goals and targets for 2020	Decision-making typology* (see Chapter 1)			Policy instruments discussed in Chapter 4	SDGs (beyond 14 & 15) intersected
	P	E	S		
Strategic Goal A. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society					
1: Awareness increased	●		●		
2: Biodiversity values integrated	●	●	●	National accounting & valuation	1, 16
3: Incentives reformed	●	●	●	Payments for ecosystem services Green growth policies	1, 2, 6, 7
4: Sustainable production and consumption	●	●	●	Trade regulation Certification (commodities, jurisdictions)	12
Strategic Goal B. Reduce the direct pressures on biodiversity and promote sustainable use					
5: Habitat loss halved or reduced	●		●	Payments for ecosystem services	1, 2, 7, 10, 12, 13
6: Sustainable management of marine living resources	●	●	●		2
7: Sustainable agriculture, aquaculture and forestry	●	●	●	Agrobiodiversity	2, 12
8: Pollution reduced	●	●		Environmental impact assessments	2, 3
9: Invasive alien species prevented and controlled	●	●	●		15
10: Pressures on vulnerable ecosystems reduced	●	●	●	Environmental impact assessments	
Strategic Goal C. To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity					
11: Protected areas increased and improved	●		●	Protected areas	
12: Extinction prevented	●		●		
13: Genetic diversity maintained	●	●	●		
Strategic Goal D. Enhance the benefits to all from biodiversity and ecosystem services					
14: Ecosystems and essential services safeguarded	●	●	●	Payments for ecosystem services	13
15: Ecosystems restored and resilience enhanced	●	●	●	IPLC territorial management	13
16: Nagoya Protocol in force and operational	●	●			2, 3, 16
Strategic Goal E. Enhance implementation through participatory planning, knowledge management and capacity building					
17: NBSAPs adopted as policy instrument	●				16
18: Traditional knowledge respected and integrated	●		●	IP territorial management	16
19: Knowledge improved, shared and applied	●	●	●		16
20: Financial resources from all sources increased	●	●			16, 17

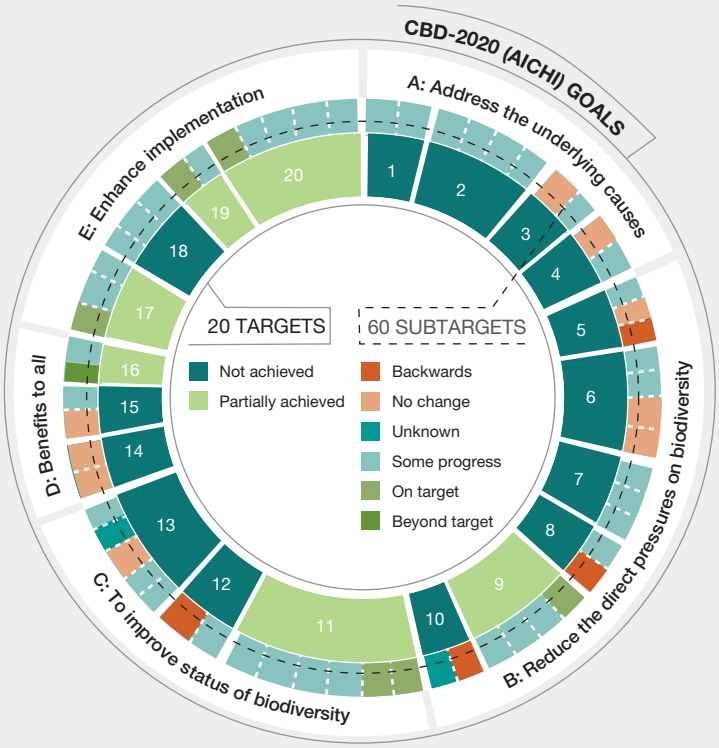

Figure 4 5 **Reported progress in National Biodiversity Strategies and Action Plans of the Aichi targets (Table 4.1) for the CBD (SCBD, 2020).**

to create new ones, rather than replace or change the power of existing ones (Andrews, 2013). This contributes to the institutional jungle through which only skilled guides can find their way, creating niches for new specialized combinations of knowledge and power. Against this background it should not be a surprise that "to-whom-it-may-concern" type knowledge products, including results of valuation studies, have a relatively poor track record of uptake in decision making processes (Cash *et al.*, 2003; Clark *et al.*, 2016). Many public policy decisions deal with the interface of public and private sector values and institutions.

4.3.2 The interface of public and private sector values in global trade

Existing economic drivers of natural resource extraction and appropriation (via institutions such as financial and industry legislation, subsidies, trade agreements and other formal economic institutions) make trade-offs between economic growth and the protection of nature's contributions to people (NCP). These institutions reflect and reinforce the knowledge-power nexus. They reveal how much less effective valuation of nature as abstract entity may be compared to the values currently expressed in the SDGs in the (international) public domains or by indigenous peoples and local communities. In particular, the formal institutions governing the global supply chains, and the natural resource extraction these institutions enable, reveal very different values of nature compared to the values expressed by indigenous peoples and local communities, generating conflicts around extractive projects (Ghazoul & Kleinschroth, 2018; Zeng *et al.*, 2021).

International trade is a major economic driver causing ecosystem degradation and the IPBES Global Assessment (IPBES, 2019b) emphasizes the importance of reforming trade agreements to internalize externalities. In the scientific debate on trade and environment, investor-state dispute settlement has been identified as one of the most controversial individual trade institutions (Pelc, 2017). Investor-state dispute settlement is a mechanism that provides private foreign investors legal recourse, in ad hoc international arbitral tribunals, against new government regulations which harm their investments (Bronckers, 2015).

Investor-state dispute settlement mechanisms in the North American free trade agreement (NAFTA) have increased the power of corporations to get compensation from governments for "indirect expropriation," even if governments did not intend or gain from the regulation (Pelc, 2017). For example, the California-based waste disposal company, Metalclad, obtained a $16.7 million

award against Mexico after the arbitration panel in 2000 found that the Mexican decision to make a nature reserve was an indirect expropriation of Metalclad's investment in a pre-existing landfill (italaw, 2015).

Investor-state dispute settlement mechanisms are also included in the trans-Pacific partnership (TPP), and the comprehensive economic trade agreement (CETA); in the latter referred to as an investment court system which is a transition to the creation of a multilateral investment court (Mbengue & Schacherer, 2019). Some kind of mechanism is probably needed to protect investors from indirect expropriation (Quick, 2015). However, Bernasconi-Osterwalder and Mann (2019) argue that CETA represents a missed opportunity to include recent advances in corporate social responsibility and sustainable investments and therefore has reinforced the protection of the investor's right to profits. Besides, the values expressed by the investor-state dispute settlement institution have also resulted in regulatory chill (Tienhaara & Ranald, 2011), i.e., *"strategic litigation by investors whose aim is not only to obtain compensation but also to deter governments' regulatory ambitions"* (Pelc, 2017).

Values of various aspects of nature can be revealed from national legislation as well as other institutions and policies for natural resource extraction (e.g., mining policies). By comparing the gross and net revenues of the extraction projects enabled by such policies with the social costs of these projects, it can be estimated how society values nature when designing and implementing these policies and institutions. It was difficult to make a systematic literature review because mixed methods are used to estimate the social costs in these case studies. The first two cases, coal mining in Colombia **(Box 4.1)** and the Mountain Valley pipeline in the United States of America

Box 4 1 Coal mining in Colombia.

Mining in Colombia is promoted by the mining code (El Congreso de Colombia, 2001) to advance industrialization, generate jobs and development, increase exports and produce royalties for the state (Cardoso, 2015). Policies to protect ecosystems and biodiversity as well as rights granted to Afro-descendant and indigenous communities have been violated by permits for exploration and mining (ABColombia, 2012; Vargas, 2013). In a recent assessment, mining activities account for 42% of reported environmental conflicts in Colombia (Pérez-Rincón, 2014).

The open-pit coal mining in Cesar takes place in tropical dry forests. Local communities protested in 2007 against high levels of air pollution and the presence of respiratory disease (Cardoso, 2015). Using mixed methods, Cardoso (2015) estimated the external costs for extraction and transportation of coal within Colombia to 110-160 USD/ton, or 0.014 – 0.02 USD/kWh (1 ton = 8141 kWh). The largest components of this cost are public health loss (extra mortality and morbidity), mining waste effect on soil, and transportation (noise and air pollution). The global external cost for coal combustion has been estimated to 370 – 1900 USD/ton (Epstein *et al.*, 2011) and to 1,140 – 2,770 USD/ton coal (Shindell, 2015). This includes the effect on climate change and other pollution. Hence, the external cost of coal, for extraction, transportation and combustion, can be estimated to 480 – 2,930 USD/ton (0.06 – 0.36 USD/kWh).

The market price (gross revenue) of coal at the time of this analysis (June 2019) was 70 USD/ton coal and has over the last ten years varied between 50 and 140 USD per ton. The net revenue for coal producers is the gross revenue minus the internal costs for extraction, transportation and other operational costs. The external cost of carbon by far exceeds the 10-year highest market price by a factor of between 3.5 and 20. For the coal producing country, the external costs for extraction and transportation are of the same magnitude as the highest market price and when the internal cost for extraction and transportation are subtracted the net revenue becomes negative. These estimates suggest that coal mining and coal combustion are uneconomic activities when external costs are considered (Cardoso, 2015).

These external costs affect at least eight nature's contributions to people: (i) habitat creation and maintenance, (ii) regulation of air quality, (iii) regulation of climate, (iv) regulation of freshwater quantity, location and timing, (v) formation, protection and decontamination of soils and sediments, (vi) physical and experiential interactions with nature, (vii) symbolic meaning, involving spiritual, religious, identity connections, social cohesion and cultural continuity and viii) preservation, by organisms and ecosystems, of options for the future (González-Martínez *et al.*, 2019). Hence, the value of these nature's contributions to people is inadequately recognised by policies and institutions promoting coal mining and coal combustion for energy (Cardoso, 2016).

There are several competing hypotheses of why fossil fuel extraction continues despite being uneconomic. First, the external costs are easily overlooked by actors who focus on the tangible monetary revenues more than the often intangible external effects on health and ecosystems. Nevertheless, this short-termism reveals a very low value of nature and human lives. Second, and related to the first, the people who benefit may be clearly differentiated from the people who bear the costs, which reveals power imbalance at the national level (Strambo *et al.*, 2020). Third, the government may understand the problems but be forced to pay debt service and therefore approve uneconomic mineral extraction which reveals international power imbalance (Strambo *et al.*, 2020).

Box 4 2 The Mountain Valley pipeline.

The Mountain Valley pipeline is a proposed $4.6 billion USD project to transport fracked natural gas nearly 500 kilometres from the state of West Virginia (in the United States of America) to an existing transport terminal in Virginia. According to the project's environmental impact statement, construction of the Mountain Valley pipeline will require converting approximately 8,810 hectares of forest into new edge habitat, crossing over 1,100 streams and wetlands, and traversing roughly 950 individual steep slopes across the Appalachian Mountains. In August 2017 the United States Court of Appeals for the District of Columbia Circuit concluded that estimates of carbon dioxide emissions for the Mountain Valley pipeline were inadequate (United States Court of Appeals, 2017).

While construction of the Mountain Valley pipeline began in February 2018, the project is facing a growing list of physical and legal setbacks, and consequently increasing costs and a delayed completion date. Lawsuits led by the Sierra Club and other civil society organizations have resulted in multiple permits being vacated. In July 2018, the United States fourth circuit court of appeals concluded the United States forest service and bureau of land management had erred in their issuance of permits to the Mountain Valley pipeline to cross national forest and other federal lands. Specifically, the court found the agencies had failed to comply with their obligations under the national environmental policy act, the national forest management act, and the mineral leasing act (United States Court of Appeals, 2018b). In November 2018, the United States fourth circuit court of appeals similarly concluded the United States army corps of engineers had erred in its issuance of nationwide permit 12, which applies to stream and wetland crossings. Specifically, the court found the corps had failed to comply with the clean water act (United States Court of Appeals, 2018a).

Despite the vacation of these permits, and presupposing the reissuance of the permits, construction of the Mountain Valley pipeline is proceeding in a piecemeal fashion in all areas of the pipeline route not affected by the individual permits. Environmental liabilities can be operationalized under three types of responsibilities: moral, legal, and economic (Cardoso, 2015). In the Mountain Valley pipeline case there is yet no estimation of the external costs. The case however highlights how values of nature, recognised by the clean water act, the national environmental policy act, the national forest management act, and the mineral leasing act have been compromised.

Box 4 3 Implicit valuation of biodiversity and ecosystem services in administrative procedures.

Based on analysis of the text of the Norwegian planning and building acts and sector acts, Winge (2017). observed a systematic difference in the relative supremacy of laws in the case of conflicts of interests between sectors **(Figure 4.6)**.

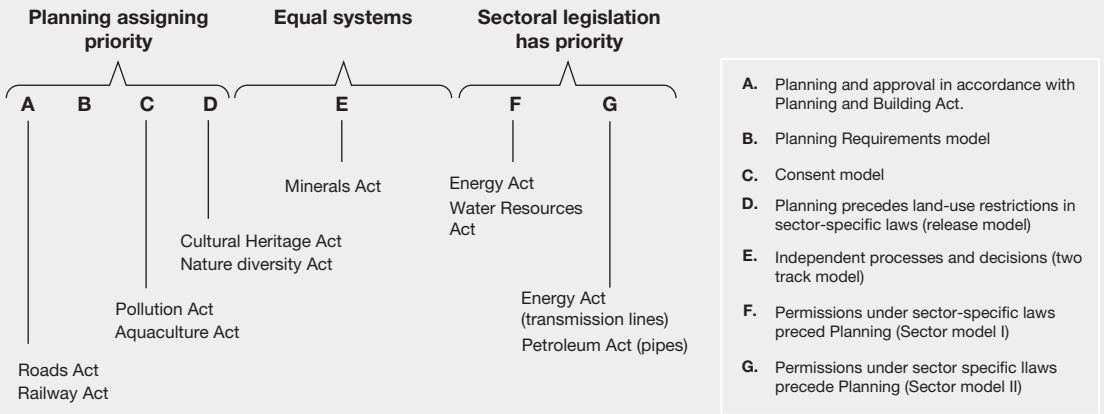

Figure 4 6 **Articulation of nature values relative to sector interests based on a legal analysis of the relative supremacy laws in conflicts of interests between sectors (adapted from Winge, 2017).**

Box 4 3

Figure 4.6 shows that the planning and building act is given legal precedence over the nature act, but the energy, water resources, and petroleum acts take precedence over the planning and building act, and *ipso facto* over the nature diversity act.

Differences in the relative power of legislation to articulate sector values also comes about through political instruction to line ministries of how to interpret legislation that is in conflict. In a situation where the nature diversity act is categorized in the weakest category of acts ("planning given priority"), the decision-making in planning is sensitive to political signals through government administrative circulars. Government administrative circulars and administrative decisions on sector-contested planning decisions constitute a further source of evidence not assessed by Winge (2017). Recent studies shed light on how a specific government administrative circular (to avoid objections to municipal plans) has influenced the weighing of contested concerns by county governors (Hanssen, 2018; Myklebust, 2017). As a result, the well-developed hierarchical valuation system of the nature diversity act was undermined.

In conclusion, where there was a conflict of interest in Norway between national legislation and local development interest, politically dictated administrative practice and precedence implicitly valued nature interest lower than local development interests, which in turn was subordinate to energy sector interests. Researchers recommend strengthening the role of the planning and building act which mandates a more explicit balancing of sector interests through public hearing procedure.

(see **Box 4.2**), illustrate the difficulties of policy integration and mainstreaming the values of nature in sector policies and implementation.

To what extent are administrative decisions based on formal valuation in e.g., environmental impact assessments, and to what extent are they based on administrative instruction (e.g., administrative circulars; administrative guidance documents) by the government to line ministries? Within the adjudicating ministry, who makes the decisions? Who carries out trade-off analysis between interests? Who has valuation power? A case study in Norway **(Box 4.3)** illustrates how value conflicts and priorities between biodiversity conservation, sector interests and municipal land-use interests are articulated in sector and planning legislation interpreted in administrative decisions. The evidence used is a review of legal analysis, interviews, and objection cases adjudicated by county governors and the ministry of planning.

4.3.3 The values shaping sustainability certification schemes

Sustainability certification of agricultural and other raw products has been promoted as a way of making markets work for sustainability. It involves standard setting by representatives of social, environmental, and economic interests, with third parties accredited to certify where the standards have been met (Steering Committee of the State-of-Knowledge Assessment of Standards and Certification, 2012). The state of sustainable markets 2020 reported that the certified commodities reached a global share of the total area of at least 15%-27% and grew by at least half (+52%) in the five-year period (2014–2018). The state of sustainability initiatives review: standards and the blue economy (Potts *et al.*, 2016b) covered 20.8 million metric tons, accounting for approximately 95 per cent of the world's certified seafood in 2013 and grew from 500,000 metric tons (0.5 per cent of global production) to 23 million metric tons (14 percent of global production) in 2003–2015.

Profitability in global trade depends on matching standards of consumers, especially where the latter have real choices to make. Where consumers start to feel and express personal responsibility for their footprints that reflect the social and environmental consequences of production (e.g., including effects on tropical deforestation) and adjust their consumption choices, voluntary certification schemes have emerged for many commodities in global trade (Glasbergen, 2018; Mithöfer *et al.*, 2017). Threats of consumer boycotts have motivated private sector actors, often in dialogue with environmental and social non-governmental organizations, to commit to voluntary standards that exceed legal requirements (Henders *et al.*, 2018; Leimona *et al.*, 2017; Sauer, 2018). They also support independent certifying or verification institutions that publicly confirm compliance, while maintaining publicity campaigns to earn the trust of consumers **(Figure 4.7)**.

Certification programs may (but not always do) offer a price premium to producers who invest in more sustainable practices. Sustainability certification schemes constitute a way for civil society actors to hold the business sector accountable, and for companies to demonstrate that they are operating responsibly. The adoption of sustainability certification and purchase of premium products with sustainability labels are self-regulatory and voluntary decisions made by assorted actors along the value chains. These include private actors such as raw-material producers (i.e., farmers, fisheries), corporate firms, industrial associations, semi-private actors, and civil societies (i.e., mostly standard-development, certifying and verification agencies, non-governmental organizations), and public

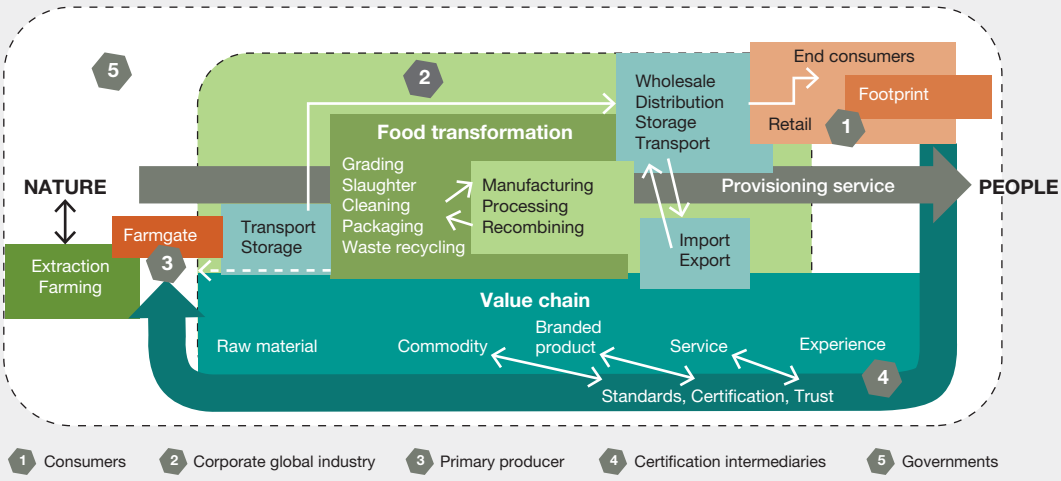

Figure 4 7 **Actors along the commodity supply and value chains.**

actors (i.e., government at various levels). If enough demand for standard-compliant products can be generated, certification can become a *de facto* condition or mandatory for safety (in the case of food production) (Almanza & Nesmith, 2004; Crespi & Marette, 2001; Ortega *et al.*, 2011) and market access (e.g., tropical timber) (Giessen *et al.*, 2016; Savilaakso *et al.*, 2017; Wibowo & Giessen, 2018). Here, the role of governments becomes more significant as they represent the developer of standards and the certifying body as institutions. Whether or not global consumers trust such government standards depends on contextual factors.

Decision-making in the context of sustainability certification provides opportunities for producers, corporates, and consumers to express their values for nature, including biodiversity and agrobiodiversity, as well as for quality of life for people in agricultural systems. Sustainable and green consumerism drives the consumers to express their relational values towards global social and environmental concerns that are often prominently published by media or non-governmental organizations. Pressures from the markets induce corporations to take more responsibility for their social and ecological footprints by joining sustainability certification schemes. Overall, values expressed by both corporates and producers in their decisions mostly serve economic enhancement goals, and thus prioritise instrumental values.

In many cases, public attention and opinion on environmental and social concerns can influence collective and individual decisions. Green-niche innovation, such as sustainability certification, starts from the emergence of new issues and concerns on biodiversity and ecosystem service degradation (i.e., loss of orangutan, forest fire, water and air pollution, increased greenhouse gas), marginalisation (i.e., child labour, eviction of indigenous people), and injustice (i.e., unfair trade, loss of forest rights). Public perceptions on such issues evolve over time through media pressures, political prominence and social interactions (Mithöfer *et al.*, 2017). The policy issue-attention life cycle **(Figure 4.3)** illustrates how public attention on sustainability and green agenda can develop predictably (Tomich *et al.*, 2004) moving *"from the pre-development* (i.e., issue emerged) *to the take-off phase"* (i.e., sustainability certification implemented; Geels, 2013).

Being an ethically oriented consumer holds an attached, yet narrow relational value on social and environmental benefits of their purchased products and services. Although socially and environmentally responsible consumption is still a nascent skill, it can reform international trade relations (Low & Davenport, 2007) (e.g., politics of palm oil) and invoke an issue-attention cycle towards more responsible markets through sustainability standards and certification. The dynamic of process along the issue-attention cycle reflects shifting from relational values of consumers to instrumental values practiced by corporates and producers through the agreed objective and standards under the certification instruments.

4.3.4 The values prioritized by consumers and producers in the context of certification schemes

The increased willingness of consumers to buy certified products is caused by the emergence and growth of contemporary ethical consumption that is associated with sustainable and green consumerism. Ethical consumption is influenced by political mobilization and representation, and new modes of civic involvement and citizen participation. Ethical consumption campaigning is a form of political action that seeks to articulate the responsibilities of family life, local

attachment, and national citizenship with a range of global concerns – where these global concerns include issues of trade justice, climate change, human rights, and labour solidarity (Barnett *et al.*, 2010). Consumer campaigns often invoke the theme of collective responsibility in the effort to motivate individual behaviour change. However, individual consumers mostly lost their direct connection to the unique values of their food and did not recognize growers' situations (Haynes *et al.*, 2012).

An experimental survey with consumers in eight countries revealed that they mostly knew about the issues, and agreed that acceptable practices involving labour, the environment, and intellectual property are essential to society (Devinney *et al.*, 2013). However, the majority did not consider such issues to be relevant to them personally. They perceived the sustainability was beyond consumers' responsibility and put the product functionality, taste, and price upfront compared to its ethical product features (Devinney *et al.*, 2013; Poelmans & Rousseau, 2016). At the general level, consumers express concern with environmental issues, while at the product-related level, this concern diminishes (Grunert *et al.*, 2014).

From the corporate and global industry perspective, companies are required to promptly and efficiently deal with and respond to public concerns through their sustainability efforts and practices. The most visible or successful companies often are the target of activist organizations, which have grown much more aggressive and effective in bringing public pressure to bear on corporations. This condition happens even if the corporations actually have had little impact on the problem at hand (Porter & Kramer, 2006). Further, business–non-governmental organizations partnerships in global value chains are often developed by Northern businesses and non-governmental organizations but seek to address the conditions of production in the Global South. But the potential partnerships of businesses and non-governmental organizations to bring about sustainable change remains uncertain (Bitzer & Glasbergen, 2015).

The self-declared sustainability initiatives and the measures to tackle social problems within the context of establishing sustainable sourcing of commodities still rely on third-party certification with lack of adoption of the supplier code of conduct (Lalwani *et al.*, 2018). The partnerships and collaboration programmes with different associations are presented as efficient for companies as well as farmers. Improvements in the conditions of farmers are advocated as a key result. This is relevant to the tea, coffee and cocoa value chain from the perspective of a buyer-driven model. Although there is a dynamic interaction and cross-learning between companies (including competitors), certain elements of the chain have more power than do others, arising from their position as brokers to the more lucrative global market (Humphrey & Schmitz, 2001). Another factor affecting the degree to which companies take responsibility for the social and environmental performance of their supply chains is the extent to which importance is attached to product provenance or sourcing traceability. It can be argued, for instance, that the industries where ethical sourcing is most advanced are those where the supply chain appears to be relatively straightforward and where there is already some motivation for knowing the product origin.

Global demand for sustainable seafood in 2016 was driven almost entirely by Japan, North America, and Europe. Manufacturers and retailers serving these markets have driven demand through corporate commitments to sustainable sourcing. Near-term growth in demand for sustainable seafood is likely to be driven by continuing efforts to fulfil corporate commitments and market access requirements, rather than by consumers seeking sustainable products or individual companies seeking brand differentiation (Potts *et al.*, 2016a).

From the producers perspective, in the agricultural sector farmers are producers, to whom consumers usually expect that the additional price will trickle down and ensure a more environmentally and socially responsible production process. In most cases, targeted smallholders consider certification schemes as external imputes to change that interferes with their locally embedded practices, rules, and institutions (Glasbergen, 2018; Schouten *et al.*, 2016). For example in the case of coffee and oil palm production by smallholders the main motivation for farmers in joining certification schemes is economic profit (Glasbergen, 2018). To them, certification is a tool that needs to bring a price premium. Another critical attribute, particularly in coffee, is a flexible system of contracts that opens opportunities to switch to market openings that offer the best price. Certification schemes, as a sustainability tool, which consumers are assumed to prefer because of the environmental and social conditions of production, tends to be reframed by the smallholders as a marketing tool to increase their income. This does not necessarily mean that farmers do not value environmental concerns or the social aspects of their practices, but their preferences regarding certifications are primarily economically driven (Hidayat *et al.*, 2018; Ibnu *et al.*, 2018).

4.3.5 Avoiding new value externalities in policy design

4.3.5.1 Introduction

Policies promote values and this can have unintended feedback effects on other values. Value externalities involve effects on peoples' priorities and value-related constructs

(motivations, attitudes, etc.; **Figure 2.12** and **Figure 2.18**). Specifically, this section addresses the hypotheses that a discourse based on instrumental values such as ecosystem services and the introduction of economic incentives (e.g., payments for ecosystem services or fines) can lead to a reduction in pro-environmental values and, ultimately, behaviours, undermining the effectiveness of policy instruments.

Building on previous literature reviews (Akers & Yasué, 2019; Festré & Garrouste, 2015; Rode *et al.*, 2015) and incorporating a significant number of recent publications on the theme, this subsection examines the empirical evidence on such value externalities, with a focus on how careful policy design and communication processes can reduce the risk of unintended negative effects or even promote positive effects. Details on the analysis and studies underlying this summary are provided in Annex 4.4 and data management report[3].

4.3.5.2 Value externalities from policy discourse

Few studies have addressed the potential for value externalities from using a broad policy discourse based on instrumental or non-instrumental values of nature, respectively. They analyse the impact of specific framings of the *reasons* to, e.g., support environmental policy or engage in pro-environmental behaviour. The evidence is inconclusive. Three studies suggest detrimental effects resulting from instrumental value framings (Andrews *et al.*, 2013; Bolderdijk *et al.*, 2013; Rode *et al.*, 2021), while two other studies do not find such an effect (Bernauer & McGrath, 2016; Evans *et al.*, 2013) and another two (Rode *et al.*, 2017; Steinhorst *et al.*, 2015) find that instrumental value frames positively affect environmental behaviour. Regarding non-instrumental value framing, three studies present suggestive evidence that it may reduce people's pro-environmental behaviour (Evans *et al.*, 2013; Rode *et al.*, 2017; Steinhorst *et al.*, 2015), while one (Bolderdijk *et al.*, 2013) found no effect. With respect to a combination of instrumental and non-instrumental value frames, Evans *et al.* (2013) found no effect, while Rode *et al.* (2017) found the combination of arguments to perform best.

4.3.5.3 Value externalities from economic incentive policies

A larger body of literature has examined value externalities from introducing economic incentive policies, particularly whether such policies can affect intrinsic motivations for nature conservation (so-called motivation crowding) (Ezzine-de-Blas *et al.*, 2019; Rode *et al.*, 2015).[4] Some argue that introducing economic incentives can cause crowding out of intrinsic motivations, which would decrease the effectiveness of the policy while in place, and could lead to counterproductive effects when the policy is eventually discontinued (Ezzine-de-Blas *et al.*, 2019; Rode *et al.*, 2015). For example, when economic incentives are stopped (e.g., a payment for ecosystem services scheme terminates) conservation could fall below the pre-policy level. Others have questioned the presence or importance of crowding out effects and/or pointed out that well-designed policies could even enhance intrinsic motivations (so-called crowding in) (Ezzine-de-Blas *et al.*, 2019; Rode *et al.*, 2015). 53 studies were identified that empirically assessed motivation crowding effects of introducing economic-incentive policies in the context of ecosystem services or biodiversity (Annex 4.4). These studies vary considerably in location, conservation context, policy design, methods and analytical rigour, which makes drawing conclusions challenging. What emerges clearly, nevertheless, is that there is by now strong empirical evidence that all three potential outcomes are possible: economic-incentive policies can cause crowding out or crowding in or have no motivation crowding effect.

Economic-incentive policies vary considerably in their design, process of formation and implementation (Bowles, 2016; Engel, 2016), e.g., they can be based on positive or negative incentives (e.g., payments for ecosystem services vs. fines), differ in other "hard" policy design features (e.g., incentive level or targeting) or how they are communicated ('framing'), and vary in how participatory they are and the policy mix they are part of. Such policy features can influence motivation crowding via mediating factors, such as perceptions on (i) how fair the policy is, (ii) the degree of resource users' self-determination, and (iii) other resource users' preferences and behaviour (Akers & Yasué, 2019; Bowles & Polanía-Reyes, 2012; Ezzine-de-Blas *et al.*, 2019; Frey *et al.*, 2004; Rode *et al.*, 2015). Studies also differ in socio-cultural context (e.g., trust and social cohesion), which may influence motivation crowding outcomes. Here the text focuses on extracting policy guidelines for avoiding crowding out or even inducing crowding in. For this purpose, studies are needed that compare different variants of individual policy features in a systematic way. 32 studies were identified to have done so (Annex 4.4). Here the focus is on policy features that have been examined by at least two methodologically solid studies (others are described in Annex 4.4)

3. Systematic review on motivational crowding by economic incentives in conservation policies (https://doi.org/10.5281/zenodo.4390995).

4. The literature reviewed for this section uses the terms "intrinsic and extrinsic motivations or preferences." Extrinsic motivations mean that an activity is done for its instrumental value, i.e., in order to attain a separable outcome (Ryan & Deci, 2000). Here this mainly means motivation based on economic incentives (e.g., an action motivated by receiving material gains). Intrinsic motivations, by contrast, are those based on pro-social and pro-environmental preferences (or values, IPBES terminology), i.e., people acting for the public good or the well-being of others or for the environment. Note that intrinsic motivation is not the same as intrinsic value (see also definitions of concepts in section 2.2.3 of Chapter 2).

Motivational crowding effects of economic incentive policies arguably depend on how the specific incentive level is calibrated in a given context. Extrinsic efforts to nudge motivation tend to become more salient as the incentive level increases. Various studies (Cardenas, 2004; Lopez *et al.*, 2012; Rodriguez-Sickert *et al.*, 2008) suggest that a weakly enforced low penalty may induce crowding in by prescribing the desired behaviour without attaching harsh punishments. Higher yet still weakly enforced penalties do not induce additional cooperation in their experiments, likely due to increasing the salience of extrinsic motivations at the expense of other motivations (Bowles & Polanía-Reyes, 2012). Likewise, Reichhuber *et al.* (2009) find suggestive evidence that a high collective tax crowds out intrinsic motivation. However, Velez *et al.* (2010) and Travers *et al.* (2011) suggest that the specific level of mild, indicative penalties may not be altogether irrelevant in inducing conservation. Velez *et al.* (2010) find that lower penalties may support or hinder collective action for resource conservation whereas mild penalties support or do not affect collective action, pointing at the importance of analysing these effects within the specific socio-ecological and governance context in which incentives are deployed. With respect to payment for ecosystem services, Handberg and Angelsen (2019) find that its effect on conservation behaviour decreases with payment level, which they suggest could be due to crowding out of other motivations for forest conservation and/or an increase in other motivations for forest use. Chervier *et al.* (2019) find that as the payment level increases, so does the probability to perceive monetary values from forest conservation. Whether policy conditions *targeting* particular areas induce motivation crowding effects appears to depend on whether the policy is perceived as fair by the target population, which in turn is likely to be context-dependent (Bernal-Escobar *et al.*, 2021a; Moros *et al.*, 2020).

The relative performance of payments based on individual vs. collective performance depends on pre-existing social ties, the degree of communication, and local fairness perceptions. Narloch *et al.* (2012) find suggestive evidence that collective payments (i.e., based on group performance) induce crowding out compared to individual payments (based on individual performance). They argue that individual rewards trigger reciprocity, while collective rewards induce free-riding. No communication was allowed in their study, which likely hampered coordination within the group. Midler *et al.* (2015) suggest that individual and collective payments both induce crowding out, but that the effect is stronger for collective rewards, which seems related to participants perceiving the collective payment as unfair. Collective payments performed better when implemented in groups with strong social ties and when communication was possible. Under such conditions, Salk *et al.* (2017) found that collective payments outperformed individual payments, and explained this by collective payments increasing communication and that local respondents perceived the collective incentive as fairer. Moros *et al.* (2019) found that individual payments had no motivation crowding effect, while collective payments crowded-in social motivations, which they explain by collective payments activating social belongingness. Regarding post-policy motivation crowding effects, Salk *et al.* (2017) and Kaczan *et al.* (2019) found no motivation crowding effect of either of the two payments, while Moros *et al.* (2020) suggest that both crowd in other motivations for conservation.

4.3.5.4 Avoiding motivational crowding

Communicating (framing) payments for ecosystem services in line with local values can help avoid crowding out or even induce crowding in. Payments for ecosystem services is an increasingly-popular mechanism for financing conservation, with hundreds of programs worldwide (Milne *et al.*, 2019; Salzman *et al.*, 2018). Payments for ecosystem services is here broadly defined as monetary or in-kind transfers to individual or collective landholders that incentivize, compensate, or reward land uses beneficial for the production of pre-defined ecosystem services. Some have argued that it matters whether payments for ecosystem services are referred to as payments, compensation, reward, or co-investment (Ezzine-de-Blas *et al.*, 2019; Leimona *et al.*, 2018; van Noordwijk *et al.*, 2012). Bernal-Escobar (2021b) indeed found that framing payments for ecosystem services as a reward that acknowledges conservation as an achievement induced crowding in compared to calling it payment, while framing payments for ecosystem services as compensation had no effect. Three studies indicate that emphasizing those values that are in line with pre-existing values and/or human-nature relational models could reduce the risk of crowding out and even induce crowding in. Maca-Millán *et al.* (2021) found that priming and emphasizing context-specific intrinsic and relational values led to crowding in. Lliso *et al.* (2021) found that emphasizing relational values in an indigenous community in Colombia induced crowding in, whereas emphasizing instrumental values performed better in a Campesino community. Bernal-Escobar *et al.* (2021b) show suggestive evidence that an emphasis on cultural ecosystem services obtained from forest conservation induced crowding in compared to emphasizing only regulatory water services targeted by the payments for ecosystem services program, and that this effect is stronger for farmers who reported moral reasons for taking pro-environmental actions.

Participation in the design and enforcement of incentives has the potential to crowd in intrinsic motivations. Participation in the selection of the appropriate incentive scheme may in itself not be enough. Several studies suggest that allowing the relevant actors to participate in the selection of a specific incentive scheme may induce

crowding in (Gatiso *et al.*, 2015; Kaczan *et al.*, 2017; Travers *et al.*, 2011; Vollan, 2008). However, the few studies identified that compare similar groups and same incentive structures, thus disentangling the sole effect of participatory rule-making on resource management, found no specific effects of allowing participants to vote for their desired policies (Abatayo & Lynham, 2016; DeCaro *et al.*, 2015; Rodriguez-Sickert *et al.*, 2008). Rather, results in DeCaro *et al.* (2015) indicate that it is only the combination of voting and participating in enforcement that significantly increases voluntary cooperation. Giving participants the chance to vote for and participate in the enforcement of their governing rules arguably crowds in a series of intrinsic and extrinsic motivations that sustains cooperation even after the rules and possibility for punishment are removed. Abatayo and Lynham (2016) observe that cooperation is higher when participants get the chance to vote for their rules and communicate among themselves than when the rules are imposed on them and no communication is allowed.

In summary, adjustments in the design and process of economic incentive policies can help to avoid undesirable value externalities or even promote positive ones. Motivation crowding results from the combination of policy design, policy process, and context. Therefore, which specific policy adjustments can prevent crowding out or induce crowding in also is context dependent.

Options to reduce the risk of economic-incentive policies crowding out other motivations for conservation include paying attention to

- deliberate key policy design and implementation features to address and adapt incentives to what is considered appropriate and fair in the specific setting,
- involving those addressed in key activities concerning the design and enforcement of the agreed-upon economic incentive policies,
- emphasizing in policy communication those values that are in line with pre-existing human-nature relational models, and
- making payments conditional on individual (rather than group) performance in settings where communication among resource users is difficult and social ties are weak.

4.3.6 Environmental valuation as a public goal

4.3.6.1 Different ways of reporting progress on environmental valuation

Aichi Target 2 to the CBD called for mainstreaming biodiversity values in government and society's decision-making. Progress was reported at national scale on this target in national biodiversity strategies and action plans (NBSAPs) **(Box 4.4)**. One reason for limited progress may be the lack of compliance mechanisms, including capacity-building and *sunshine* approaches such as transparency, monitoring, and participation. In this respect, insights

Box 4 4 **Aichi Target 2: mainstreaming biodiversity values in government and society's decision-making.**

'By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems'(CBD Secretariat, 2012). This target contributes to addressing the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society (Convention on Biological Diversity Strategic Goal A). Parties to the CBD have reported that the absence of economic valuations of biodiversity is an obstacle to its conservation and sustainable use. The objective of this target is to ensure that the diverse values of biodiversity and opportunities derived from its conservation and sustainable use are recognized and reflected in all relevant public and private decision-making (CBD Secretariat, 2012). The CBD proposes a theory of change whereby

> *'placing biodiversity into the same decision framework as other goods and services [..] would help give it greater visibility amongst policy-makers and contribute to the "mainstreaming" of biodiversity issues in decision-making processes'*(CBD Secretariat, 2012).

The technical rationale for target 2 identifies specific decision-making processes that may be used as indicators, including (i) biodiversity in poverty reduction strategies, (ii) biophysical inventories of biodiversity and ecosystem services, (iii) companies with policies for biodiversity-friendly practices, and (iv) national accounts reflecting state of biodiversity and ecosystem services. The target required

> *'parties to appropriately value biodiversity and increase coordination among government ministries and levels of government'*(CBD Secretariat, 2012).

from human rights review mechanisms can be useful for improving the emerging peer review mechanism of the CBD (Koh *et al.*, 2021). Furthermore, indicators of national biodiversity strategies and action plans should reflect the mainstreaming of valuation at local scales (as promoted by initiatives such as the economics of ecosystems and biodiversity (TEEB), and wealth accounting and the valuation of ecosystem services (WAVES) partnership), as well as at national scales reflected by ecosystem accounting in national accounts. The number of countries implementing natural resource accounts, excluding energy, within the system of environmental economic accounting was included as an operational indicator for the attainment of Aichi Target 2 (Vardon *et al.*, 2017). Because they are compiled by parties to the convention, national biodiversity strategies and action plans are expected to provide better coverage of biodiversity value mainstreaming in national policy documents (grey literature) than the published scientific literature assessed in section 4.6. Buchanan *et al.* (2020) reviewed Aichi target fulfilment. They did not include Aichi target 2, which was considered too difficult to monitor.

This subsection looks at the country-level coincidence between Aichi target 2 fulfilment as reported under the CBD rules, and other reporting on the implementation of the system of environmental economic accounting. It looks specifically at country reports. In section 4.6.4 Aichi target 2 reporting and system of environmental economic accounting implementation is compared to country level frequency of the valuation studies reviewed in section 4.6.3.

4.3.6.2 Blindspots and brightspots

In some cases, national biodiversity strategies and action plans report on meeting or exceeding Aichi target 2, but there is no evidence of the system of environmental-economic accounting implementation (see **Figure 4.15**).

The existence of "blindspots" in the national biodiversity strategies and action plans reporting, where the system of environmental-economic accounting accounts are being compiled yet not reflected in progress reporting on Achi target #2 is notable. The system of environmental-economic accounting accounts are carried out but not reflected in Achi target #2 reporting (unknown progress, no progress, progress but at a insufficient rate, and with no mention of the system of environmental-economic accounting accounts in the national biodiversity strategies and action plans progress reports) by at least, Angola, Australia, Chile, Czech Republic, Colombia, Ireland, Italy, Japan, Madagascar, Mexico, The Netherlands, The Nordic countries, Peru, Romania, Uganda and the United States of America.

Discrepancies between implementation and reporting may reflect poor inter-agency map coordination in reporting processes. They may also be an indication of limited uptake of the produced accounts in national decision-making. Alternative explanations are mapped out conceptually in **Table 4.2**, but evidence on reasons for this blindspot in some country reports is lacking. The national biodiversity strategies and action plans reporting is typically a function of ministries of environment and national environmental agencies, which as noted across this chapter, have limited decision-making power. However, gaps in the national biodiversity strategies and action plans reporting point to a disconnect between valuation research and the authorities responsible for reporting to the CBD. Improved coordination with biodiversity management / national biodiversity strategies and action plans implementing authorities is an essential part of the success of these approaches as evidenced by "brightspot" cases explained below.

As far as brightspots are concerned, a number of national biodiversity strategy and action plan reports reflect uptake of natural capital accounts approaches, ecosystem

Table 4.2 **Simple classification on the basis of national biodiversity strategies and action plans reporting progress on Aichi target 2 and evidence of use of valuation another documents**

		National biodiversity strategies and action plans report progress on Achi Target 2	
		YES	**NO**
Progressing using accounting and valuation in policy	**YES**	Brightspot	Reporting blindspot
	NO	Reporting blindspot	Real valuation gap

valuation or the system of environmental-economic accounting consistent with available data on the system of environmental-economic accounting compilation. These include Canada, Egypt, Indonesia, Nigeria, Malaysia, South Africa, the United Kingdom (in particular its overseas territories). Other notable brightspots reflected in the national biodiversity strategies and action plans reporting include Rwanda, South Africa, Indonesia and the United Kingdom. Strong progress is seen in the system of environmental-economic accounting implementation in Rwanda which is reported and reflected in their progress reports to the CBD. Rwanda reports development of natural capital accounts for land, water, minerals and ecosystems. It also reports positive uptake in the use of the findings of these accounts, particularly in the implementation and tracking of progress of the Rwanda land use development master plan. Success here is seen to be due to a high-level ministerial support (ministry of finance chairs natural capital accounts committees), strong interagency coordination, centralisation of data collection within national statistical offices and working directly with end users to compile accounts (CBD, 2021; Republic of Rwanda, 2016; Rutebuka, 2019).

South Africa has compiled both land and ecosystem accounts, and both are reflected in the national biodiversity strategies and action plans progress reports. The implementation of natural capital accounts in South Africa is co-lead by Statistics South Africa and the South African National Biodiversity Institute. South Africa has seen uptake of natural capital accounts in policy in decision-making processes for new mining and forestry projects, the development of its national water and sanitation master plan, and the use of species accounts for the management of charismatic species. South Africa has seen over 20 years of efforts to compile various natural capital accounts, starting with environmental accounts for water in 2000. Its success in mainstreaming can be partially attributed to this longevity of practice as significant time is needed to develop local capacity and systems (CBD, 2021; Republic of South Africa, 2015; Statistics South Africa, 2021).

In Indonesia the compilation of land management accounts has assisted with assessing the impact of different land use decisions on emission pathways. Natural capital accounts assisted in identifying major drivers of greenhouse gases emissions through deforestation and helped to highlight the importance of peat swamps as carbon stores and the importance of protecting them in future development pathways. These accounts contributed directly to the development of the low carbon development initiative for Indonesia (LCDI) to explicitly incorporate greenhouse gases (GHG) emissions reduction targets into the country's MidTerm Development Plan (RPJMN 2020-2025) by Bappenas (Indonesia's national development and planning agency) (Republic of Indonesia, 2015).

In the United Kingdom, natural capital asset and ecosystem service accounts are published by the office of national statistics and has seen the publication of natural capital accounts for a number of its United Kingdom's Caribbean and South Atlantic Overseas Territories. In the United Kingdom natural capital considerations are mainstreamed in a number of ways (Bright *et al.*, 2019; JNCC, 2014). See 4.6.4 for a detailed description of the United Kingdom uptake at different scales.

These brightspots reflect a high level of mainstreaming of biodiversity concerns across various arms of the government, including the national bodies responsible for account compilation, end users and national agencies responsible for CDB reporting.

National biodiversity strategies and action plans also report uptake of thematic satellite accounts, which can play an important role for addressing sector issues of national importance in national biodiversity strategies and action plans target #2 reporting. Botswana has compiled water, energy and mineral accounts, with water accounts influencing the national spatial development plan for Botswana 2036, the Botswana national water conservation and water demand management strategy 2016-2021 and other regional plans, encouraging the increased use of effluent wastewater, and reconsideration of industrial water abstraction fee structures. Notably, the compilation of water accounts is led by the primary end user of the accounts, the Department of Water affairs (Ministry of Finance and Economic Development, 2021; Republic of Bostwana, 2016). In other cases, the system of environmental-economic accounting accounts are not explicitly mentioned in Aichi target 2 reporting, yet evidence of the uptake of monetary valuation into government decision-making is clear and reflected in progress reports. For example, Canada, which publishes the human and activity report, accounts for landscape change, freshwater (supply, use, condition), agriculture and forests (Canada Statistics, 2017). See 4.6.4 for an in-depth analysis of system of environmental-economic accounting ecosystem accounting implementation.

4.3.6.3 Barriers to uptake

Even when accounts are successfully compiled, many barriers to institutional uptake persist. Virto *et al.* (2018) provided evidence that there is very little use of natural capital accounts for public policy decisions, and more so in developing countries. Most relevant obstacles they observed were the lack of political support by key people and institutional leadership unable to promote policy use by other ministries.

Satellite accounts have strong uptake where key end-user institutions are involved directly (co-leading) account

compilation. A few examples exist of this for land use accounts (Rwanda, Guatemala, Indonesia), water accounts (South Africa) and mining (Philippines, Rwanda, Botswana). In cases where land accounts were successful in influencing planning decisions such as Rwanda and Indonesia, planning and land use authorities as end users were directly involved in account compilation, which meant efforts to compile accounts were directly related to the implementation and monitoring of national plans / policies already in existence. Further, success in Rwanda was partially due to the adaptation of available data compiled by land management authorities to the system of environmental-economic accounting (Republic of Bostwana, 2016; Republic of Indonesia, 2015; Republic of Rwanda, 2016; Republic of South Africa, 2015; Republic of the Philippines, 2016; República de Guatemala, 2013).

Success is typically seen where the process is co-lead by two or three institutions. Examples from the national biodiversity strategies and action plans reporting include:

- A high ministerial body with large power leads the process politically and gives it political validity (Ministry of Finance and Economic Planning (MINECOFIN) (Rwanda) / Ministry of Planning (Indonesia) or the Prime Minister's office (United Kingdom))
- A recognised national statistical institute national body leads data collection and management with a clear mandate of publishing official statistics (Statistics South Africa, The Indonesian Institute of Sciences, National Institute of Statistics of Rwanda, The Office for National Statistics in the United Kingdom)
- There are national institutions most likely to use accounts such as the ministry of planning (Ministry of National Development Planning Indonesia, Rwanda Land Management and Use Authority)

National biodiversity strategies and action plans reviewed in this subsection show that natural capital accounting approaches support policy development, as well as functioning as a mechanism to increase the accountability of existing policy and regulations. While evidence points to these approaches having a positive influence on national *big picture* issues, and approaches of large public and private sector institutions, they should also be recognised as potentially powerful tools for civil society actors who want to promote public sector accountability and enhanced implementation and adherence to existing environmental policy. Deepening collaboration with civil society actors and local peoples in account compilation would enhance their ability to influence decision-making and advancement of plural valuation approaches.

4.4 MULTI-INTERCULTURAL TERRITORIES: VALUES ARTICULATED BY INSTITUTIONS ACROSS SCALES

4.4.1 General introduction

Multi-intercultural territories around the world have been the result of historical and cultural relationships between indigenous, local communities, and national and global peoples and institutions (Dietz & Mateos, 2013; Lazos, 2013; Olaya Díaz, 2017). Many territories have been transformed since colonial regimes into commercial plantations (e.g., sugarcane, rice, coffee) and extensive cattle-raising. Their settlement and expansion have led to the control of indigenous territories with impacts on land-use conflicts. Thus, territories are a plethora of biocultural landscapes where negotiations, collaborations, confrontations and tensions of values of nature exist (de la Cadena, 2010; Escobar, 2008).

Context-specific variations in multi-intercultural territories illustrate numerous ways in which values of nature can be included in decision-making processes: from more plural and inclusive valuations to less plural dominated by hegemonic values valuations through time and geographical scales. At the more plural end of the spectrum, values at local and regional levels have been expressed in restoration programs of forests (Leone, 2019), lakes (Holtgren *et al.*, 2014), marine areas (Di Franco *et al.*, 2020) and co-management of overlapped areas between indigenous territories and national parks (MAVDT, 2009; PANI & PNCC, 2010). Such decisions are negotiated by several actors: public actors (e.g., department of natural resources; indigenous authorities; natural park officials); private actors (transnational and national enterprises); civil society (e.g., village associations, non-governmental organizations), all who have played a part in socio-environmental, political and economic decisions, depending on their power relations (**Figure 4.1** arrows 3A, 3B, 3C) and their knowledge (**Figure 4.1**, arrows 4A, 4B, 4C, 4D). Integration of diverse values in decision-making contexts can improve decisions in terms of achieving broad inclusion, legitimacy and potential reduction of environmental conflicts (de la Cadena, 2010; Escobar, 2008). However, examining the role of local institutions (e.g., beliefs, attitudes, social networks, customary norms, cooperatives, associations) in several decisions reveals a lack of coordination between the various institutions responsible for regulating social interactions by political jurisdiction (national, sub-national and local laws, agreements and regulations).

Valuations that elicit only one value, by contrast, display hegemonic tendencies with specific values (e.g., expressed mostly through economic valuation) benefiting certain stakeholders. These have the power to influence plans, law-making agendas and actions, by mobilizing knowledge that favours their decision-making (**Figure 4.1**, arrows 3A, 3B, 3C). In particular, the allocation of land (Bourret, 2020) and water in basins (Deutsch Lynch, 2012; England, 2019) show how the geographic location of actors using and living along the rivers determine biased management decisions; values have been privileged by central authorities in inequitable governance arrangements in favour generally of downstream users (i.e., hydropower generation and large agribusiness enterprises), while excluding other values held by upstream and midstream users. Findings demonstrate that achieving equitable governance at the watershed levels require institutional arrangements that represent diverse values as well as durable and effective alliances between users, sectoral and multi-jurisdictional actors.

Recent policies have demonstrated more plural approaches by involving cultural relational values of actors (e.g., indigenous and non-indigenous worldviews/cosmovision; emotional attachments to nature; symbolic value of species) (Chung *et al.*, 2019), co-design and management of protected areas or voluntary community protected areas (Calle, 2018). However, analyses suggest that the capacity for a plan to meet its objectives may depend on including the values of those actors involved. If the aim is the equal access to and distribution of nature's contributions to people between all actors, their values would need to be included (e.g., Millner *et al.*, 2020; PANI & PNCC, 2010; Whyte *et al.*, 2019b). When the purpose is the effectiveness of a project, those values which are most likely to affect the functioning of the project can be highlighted, given the interests, influence and resources of key actors (e.g., Kochnower *et al.*, 2015; Semitiel-García & Noguera-Méndez, 2019; Stryamets *et al.*, 2020).

The goal of this section is to evaluate the extent to which peer-reviewed literature assesses decision-making processes that consider diverse values as well as the specificities of decision-making contexts in multi-intercultural territories, involving indigenous peoples and local communities (IPLC). This section is divided into the following three subsections.

Section 4.4.2 analyses how values of nature are expressed in the decision-making process at multi-intercultural territories such as the Amazon (see 4.4.2.1) and different indigenous conservation areas (see 4.4.2.2). Specifically, it examines how knowledge and power differences influence the management decisions and the type of values prioritized with impact on IPLC rights to territories. The Amazon governance institutions illustrate that values of nature in decisions are not constant, but rather historical and dialectical, being subject to contradictions and continuities between the pursuit of economic progress, the well-being of IPLC, protection, sustainable use and conservation of rainforest (see 4.4.2.1). Indigenous conservation areas show, by contrast, a continuum between values of IPLCs, security and autonomy over their territories (see 4.4.2.2). The values of nature are therefore revealed by multiple decisions to sustain socio-ecological processes.

Section 4.4.3 presents philosophies of good living, their inclusion in policies and efforts towards sustainability by values aligned with political agendas (Audubert, 2017; Carranza & Rivera, 2016; Castillo-Gutiérrez, 2018; de Marchi *et al.*, 2017; de Zaldívar, 2017; Esborraz, 2016; García-Quero & Guardiola, 2018; Gudynas, 2009; Hayward & Roy, 2019; Merino, 2016; Peña, 2016; Perra, 2019; van Norren, 2020; Velásquez, 2018). The Yasuni case displays the influence of powerful private actors in alliance with public actors by prioritising instrumental values associated with oil extractivism and depletion of nature (see 4.4.3.1). In contrast, in Section 4.4.3.2 the different local histories, tied to sovereignty and territorial rights reveal the foundation of cultural philosophy of *Buen vivir*.

Section 4.4.4 describes diverse and contrasting values of agrobiodiversity in decision-making processes with immersed actors in the agri-food systems. In particular, instrumental values become dominant in decisions impeding the expression of intrinsic and relational values of maize in Mesoamerica and other crops among IPLC (genetic biodiversity; vital axis of rituals and spiritual life).

4.4.2 Values revealed by indigenous and local institutions

4.4.2.1 Values expressed by forestry governance institutions: the Amazon basin – a historic perspective

The Amazon, the largest tropical forest in the world, provides a wider historical context (Cronon, 1985; Hecht & Rajão, 2020; Kengen, 2019) to illustrate how values of nature are embedded in sociocultural layers of underrepresented groups (Pennino *et al.*, 2021). Management of the basin has evolved **(Figure 4.8)** with many individual-collective decisions and actions over time (Parsons *et al.* 2019). Based on the analysis of literature (Adams, 2008; Carvalho *et al.*, 2019; Evans *et al.*, 2014; Gallemore & Jespersen, 2016; Garí, 2001; Gollnow *et al.*, 2018; GTS, 2021; Hanazaki *et al.*, 2018; Nolte *et al.*, 2017; Osborne, 2015; Reydon *et al.*, 2020; Silva & Lima, 2018; Verburg *et al.*, 2014; Weinhold *et al.*, 2013), the following trends emerge, underscoring different values expressed in governance institutions and decisions with impact on the Amazon (Annex 4.5)[5].

5. Literature review for the Amazonia case-study (https://doi.org/10.5281/zenodo.4396203).

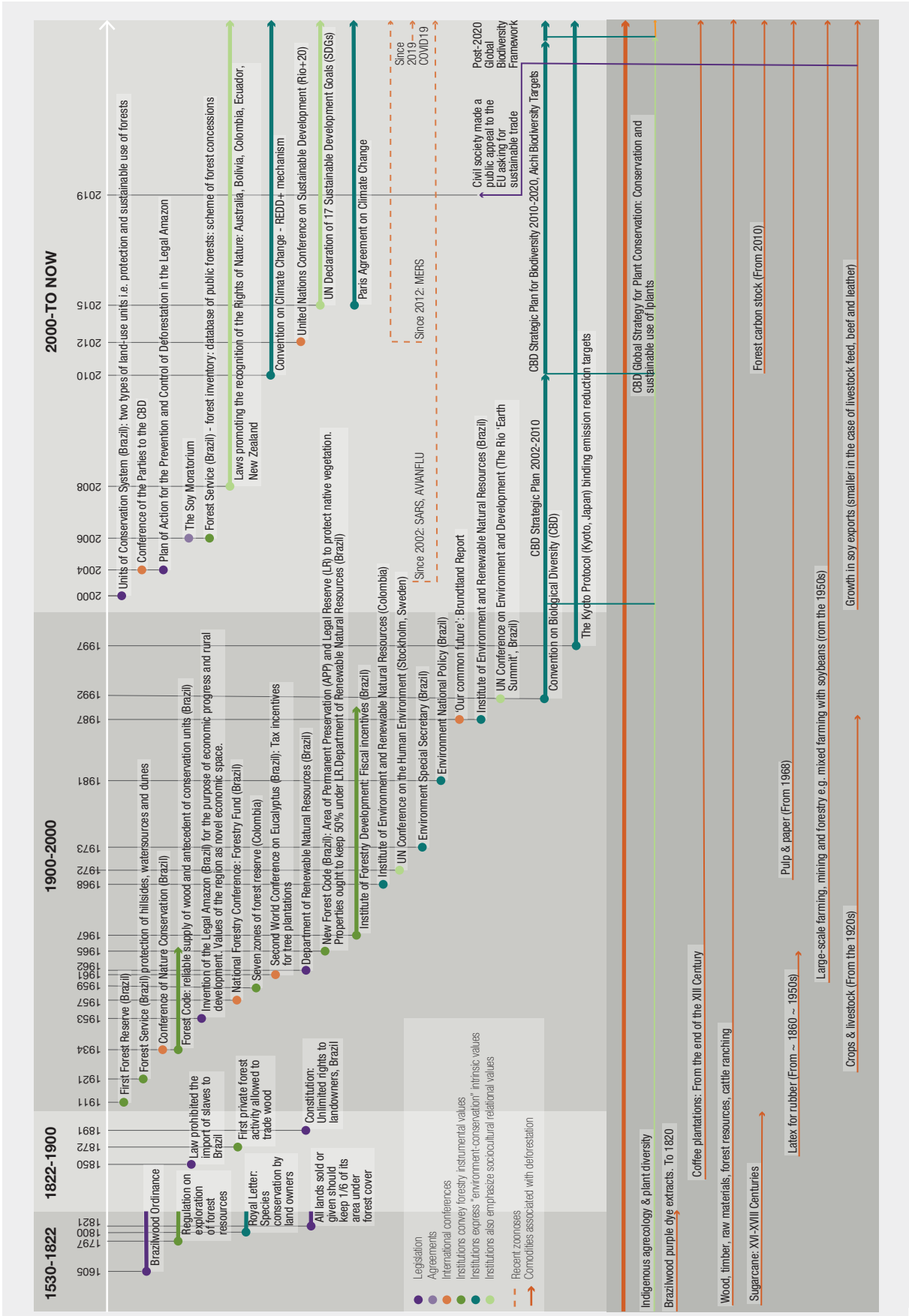

Figure 4 8 **Timeline of key governance institutions from 1500 to 2021 with impact on the Amazon.**

Since the 16th century, the predominance of instrumental values (e.g., transformation of forests, cattle ranching as dominant farming system) have been essential expressions of governance institutions (Kengen, 2019). Deforestation rates imply the prevailing value of rainforest as supplier of land, wood, raw materials, and latex for rubber even until the 20th century (Hecht & Rajão, 2020). Likewise, a transition of single values took place from extractive values to agrarian values based on sugar and coffee plantations between the 16th and 17th centuries (Kengen, 2019).

In late 20th century, policy instruments began to integrate intrinsic values associated with protection and conservation of the environment (e.g., Forest constitutional rights in Ecuador (Constitution of Ecuador, Chapter 7, Articles 71 – 74, 2008)). Through international institutions (e.g., United Nations conferences (UN 1972 – Stockholm Conference) in the last third of the 20th century, relational values were brought to the core of decisions by underlining intellectual, moral, social and spiritual growth of the human experience of interacting with nature. It is noteworthy that a direct antecedent has been conceptualised by indigenous valuations and their cosmovisions / worldviews since ancient times (Kehoe *et al.*, 2019; Lima *et al.*, 2019).

Values of local and regional institutions have been articulated alongside values of global institutions (e.g., multilateral conventions, agreements) (Hecht & Rajão, 2020). That interaction illustrates forms of globalisation of instrumental, relational and intrinsic values associated with nature and nature's contributions to people (The Nature Conservancy, 2020).

The advancement of a world capitalist system based on instrumental values of nature as commodities has brought more people into trade well beyond the boundaries of their local ecosystems (Cronon, 1985). This route had profound implications not only in terms of increased deforestation but also in the valuation of Amazon as an economic space, motivated by agricultural development goals (Kengen, 2019). For instance, **Figure 4.8** shows the direct connection between global/national institutions (legislations, conventions, agreements, policy instruments (above the red arrow)) and the valuation of rainforest and land as "merchantable commodities", by the rise and expansion of monocultures, livestock production, and carbon sinks (below the red arrow).

The early 21st century has witnessed the soy boom in the Amazon and the concomitant role of monetary values in decisions, rendering Brazil the second-leading country for soybean production worldwide (GTS, 2021). Thus, flows of national and international private capital, governmental investments (mainly credit and infrastructure projects), prospects of increased commodity prices on the international market, and the availability of relatively cheap land encouraged forest conversion and agricultural expansion in order to meet global demands for grain crops (Pereira *et al.*, 2019). However, the consolidation of soybean in eastern Amazon exacerbated social conflicts, ethnic differences between large soy farmers and local populations, disputes for land and territory, dispossession of traditional communities and agglomeration of local peoples into more urbanised spaces (Stabile *et al.*, 2020). In this context, international pressure of public opinion led Brazilian agribusiness sector to adopt the soy moratorium, a voluntary agreement between representatives of civil society, environmental non-governmental organizations, local representatives, soy producers and the Brazilian government that calls for large companies to refrain from buying soy originating from areas in the Amazon deforested after 2008 (Lima *et al.*, 2019; Myers *et al.*, 2018; Nolte *et al.*, 2017). The moratorium discourages the conversion of new forest areas to soy and encourages the intensification of land use through the expansion of soy in areas cleared before the moratorium (Adams, 2008). Currently 98% of the soy grown in the Amazon biome is located in these areas (GTS, 2021). However, two facts circumvent the agreement. First, soy growers can avoid the deforestation restrictions of the soy moratorium by establishing their plantations in other areas of native vegetation, the "Cerrado", instead of the Amazon biome. Second, indirect deforestation for soybean expansion can occur on pastures that were deforested 2-4 years prior (Sauer, 2018; Silva & Lima, 2018).

Overall, a better integration of sociocultural, agrarian, environmental and forestry values into global and national policies cannot be achieved without a clear understanding of the influence of these values and interests conveyed by global-local institutions in decisions, the social distribution of nature's contributions to people and their inter-relatedness with multiple actors. In this way, it is through local action that nature and nature's contributions to people start to be sustainably used, conserved, or lost.

4.4.2.2 Values articulated in indigenous community conserved areas

In contrast with the tensions between values in the Amazon, research of protected spaces as the indigenous community conserved areas and cultural landscapes show that a range of values are revealed by the decision to sustain intact ecological processes. By allowing them to be involved in decisions about a territory, cultures are given the space to thrive or be revitalized (Kothari, 2008). In many protected areas case studies, such as Hā'ena (United States), once protection of a territory is secured, the focus turns to a renaissance of cultural traditions and governance systems (Gon & Winter, 2019). In this case study, 'Ōiwi values—such as *aloha 'āina*, or loving the land as a familial elder; *mālama 'āina*, or caring for the land as a familial

elder (Kealiikanakaoleohaililani & Giardina, 2016), and *kia'i 'āina* or protecting the land as a familial elder – are at the foundation of this community-based subsistence resource management area (Kurashima *et al.*, 2018). Along with a revival of the values inherent in customary governance, the values associated with living cultures, traditions, practices, and expressions have also shaped IPLC choice for community-based conservation. Although unique to each community and culture, some values that play a role in the governance of a territory include collective responsibility for and accessibility to the resources, sustainable subsistence harvesting, ontologies, origin stories, and heritage processes embedded within the landscape, with all these passed down from generation to generation, and which often influence all spheres of the local lifestyle (Pawlowska-Mainville, 2021). When these values are acted upon, they represent forms of indigenous and local peoples' agency in conservation efforts, which, in turn, have been pivotal to the regeneration of mainstream conservation initiatives such as achieving ecological biodiversity that is founded on cultural diversity, as articulated in the Sustainable Development Goals (Pathak *et al.*, 2004).

Diverging values also exist within communities and within the collective decision to conserve (or not) a territory or resource. Contradicting values about community economic initiatives pose challenges to inter-generational transmission of local values and to the role that individual needs and values play in the success of community-led conservation areas. Likewise, economic values and historical circumstances pose immense challenges to IPCL, and the literature illustrates that obtaining recognition for a protected space by a local community is very difficult. For example, the Górale (Poland) are a group that underwent forced displacement, dispossession and outlawing of sheep herding because the pastoral hills and herding pastures were viewed by the state as destructive to local mountain vegetation and to the communist vision of property (Wróbel, 2013). The contested form of land title led to a massive expropriation of Górale for the purpose of "environmental protection" in the early days Poland's national park (Borucki, 2004). Sheep herding by the local people is now permitted once again, largely due to a change in public discourse around local governance and cultural heritage on these landscapes, but there is not a formal recognition of the Górale cultural landscape. Similarly, local values of the Tla-a-o-qui-aht (Canada) are ingrained in the Nuu-chah-nulth initiative to create a tribal park. Based on indigenous and local values, the watershed is run according to Nuu-chah-nulth customary governance and, while not recognized by the state (Canada), the park is an embodiment of governance and authority of the indigenous group to the area (Murray & Burrows, 2017; Pawlowska-Mainville, 2021). For this indigenous group, recognition is not important because Nuu-chah-nulth governance guides the management of the area.

Therefore, indigenous peoples and local communities are sustaining and strengthening their territories and resources with collective and culturally-rooted governance and management systems. By protecting a specific space that serves as the foundation to their very being, identity, culture, and way of life, IPLC-led resource areas provide us with a glimpse into their values and reasons as to why an in-tact territory is critical to them and to the world at large. While public support for such community-led initiatives may be present, in many cases, IPLC territoriality requires recognition, legitimation, and support, especially when faced with industry, which often disregards IPLC values and approaches to resource governance (Worboys *et al.*, 2015).

4.4.3 Values and power relations expressed in Philosophies of good living

Out of 204 coded papers as part of the Philosophies of good living review[6], a total of 140 papers (69%) address power relations. These papers evidence the different spheres in which power operates, discursively and structurally (see Annex 2.1), usually creating contentious spaces between IPLC and other actors (e.g., political actors, elites, private actors; Canedo Vásquez, 2018; de Zaldívar, 2017; Espinosa, 2017; Hartmann, 2019; Humphreys, 2017; Hutchison & Sibanda, 2017; Lalander & Lembke, 2018; Naude, 2019; Shebell & Moser, 2019; Wolkmer & Venâncio, 2017). These tensions reflect the clashes between different values of nature.

Even though some aspects of the good living philosophies have been incorporated into policy and efforts to pursue sustainability-aligned values in policy frameworks have been made (Audubert, 2017; Carranza & Rivera, 2016; Castillo-Gutiérrez, 2018; de Zaldívar, 2017; Esborraz, 2016; García-Quero & Guardiola, 2018; Gudynas, 2009; Hayward & Roy, 2019; Merino, 2016; Peña, 2016; Perra, 2019; van Norren, 2020; Velásquez, 2018), prevalence of extractivism and exploitation of nature remains. These contradictions to the philosophies of good living at national and international levels (Carranza & Rivera, 2016; Lima Cortez, 2010; Shebell & Moser, 2019) points to the structural power and the complexity of incorporating other values of nature into laws embedded in the broader capitalist system.

As for many philosophies of good living around the world whose inclusion or institutionalization of their values and principles are in early stages or currently being negotiated, the case of the *Buen vivir* philosophy, and its inclusion in the constitutions of Ecuador and Bolivia, offers an interesting case (Collado-Ruano *et al.*, 2019). Although great progress has been recognized by scholars and practitioners regarding

6. Literature review for the Philosophies of good living (https://doi.org/10.5281/zenodo.4399544).

how the *Buen vivir* has permeated the political arena, new challenges have emerged as this discourse has been pointed out to be taken as a utopia (Bravo & Moreano, 2015; Calvo *et al.*, 2019). In this sense, the underlying broad values of these philosophies have not always been translated into rules, institutions or legislative measures to break the extractive development model (de Zaldívar, 2017). The issues of how the same constitution promotes economic development favouring extractive activities like mining or oil extraction, and on the other side recognizes nature as a legal subject with different rights, exposes the inherent structural / legal contradictions or dilemmas (de Marchi *et al.*, 2017; de Zaldívar, 2017; Esborraz, 2016; Lalander, 2014).

4.4.3.1 Failed value encounters: The Yasuni case in Ecuador

The Yasuni-ITT Initiative in the Ecuadorian Amazon shows the complexities of land management in territories with high biological and cultural diversity (Bravo & Moreano, 2015; Calvo *et al.*, 2019; de Marchi *et al.*, 2017; Lalander, 2014, 2016; Valdez-López *et al.*, 2019). Recognized as a biosphere reserve by UNESCO in 1989, Yasuni is home of Waorani, Kichwa, Achuar, Shuar, Tagaeri, and Taromenane indigenous people (de Marchi *et al.*, 2017). The Yasuni-ITT initiative refers to Ishpingo- Tambococha- Tiputini, three untapped oil blocks. This initiative was part of the agenda of the long-term cooperative action under the United Nations Framework Convention on Climate Change. Through a trust fund co-managed by the Ecuadorian government and the UNDP, the idea was that the international community will contribute 50% of the income that would have been generated from oil exploitation, in order to protect biodiversity and keep social programs (Lalander, 2014). Years later, only 0.37 % of the estimated income was achieved. In 2013 the government of Ecuador finalized the Yasuní-ITT initiative and commissioned economic, legal, and technical studies for drilling in the region. This generated opposition from indigenous communities and environmental non-governmental organizations (Calvo *et al.*, 2019). This conflict evidences the contradictions between national and international policies regarding the conservation of nature and the *Buen vivir* philosophy, and on the other hand, pursuing economic development driven by extractive activities (Bravo & Moreano, 2015; Calvo *et al.*, 2019; de Marchi *et al.*, 2017; Lalander, 2014, 2016; Valdez-López *et al.*, 2019).

Even though *Buen vivir* as a vision of harmonic life with nature and nature's contributions to people by indigenous nations is considered as a constitutional principle of the Plurinational State of Ecuador, political actors differ in the interpretation and operationalization of the *Buen vivir*. The Yasuní-ITT initiative failed and oil extraction was granted to private actors (Acosta, 2010; Fleuri & Fleuri, 2018; Gudynas, 2011; Lalander, 2014), arguing national justice or the right to put "nature to the service of Nation" (de Marchi *et al.*, 2017). This example shows which actors and whose values were finally translated into decision-making revealing structural and discursive power dimensions.

This example illustrates how instrumental values dominated the rationale of decisions over the relational and intrinsic values. The civil society movement struggled against the extraction of fossil fuels, but the protection of human rights and environmental justice failed (Calvo *et al.*, 2019). Political, discursive, and structural power, on the one hand, and knowledge under the national government supervision, on the other, gave priority to instrumental values on the basis of national development.

4.4.3.2 Values articulated in Philosophies of good living and territorial rights

A total of 55 papers were examined to discuss the link between the philosophy of good living and territorial rights concerning people who identify as indigenous and who enunciate their views and interests to emphasize local ways of knowing and different local histories, especially when tied to sovereignty (13 papers). Philosophies of good living are based on decolonized perspectives as they recognize other ways of being, seeing, knowing, doing and fighting for their rights in plurinational societies (Castro-Gómez & Grosfoguel, 2007; Gudynas & Acosta, 2011; Merino, 2018). This review demonstrates the importance of territory as foundation for living out cultural philosophy; a total of 19 articles discussed land as a fundamental space for living out the culture and the epistemologies within the cultural philosophies, including coexistence between nature and humans. Furthermore, rights are based and acted upon on land; 91% of the articles emphasized that rights of IPCL are grounded in lands and resources and the promotion and protection of those rights, including legal recognition, are a continual struggle for IPLC. Finally, philosophies of good living can be used to empower communities; the review showed that communities relying on their own cultural philosophies found self-determination over their food systems (21 articles), resilience (4 articles), cultural revitalization (48 articles), and stronger governance of their natural resources (4 articles)[7].

Social and environmental governance that promotes resurgence of culture and territoriality is gaining popularity as a governance principle. In Bolivia, Ecuador, and Peru, the concept of *Buen vivir* has been institutionalized and indigenous values such as harmony and complementarity with Mother Earth and the community have been embedded in diverse socio-environmental policies (Chambi Mayta, 2017; Giovannini, 2012; Merino, 2016). As a response to values associated with capitalism, and growth of resource-

7. Literature review for the Philosophies of Good Living (https://doi.org/10.5281/zenodo.4399544).

development industries, the cultural philosophies represent highly contrasted values to take into account when making land and resource-based decisions to support IPLC territoriality. Literature shows that the Philosophies of good living can serve as legal and ethical mechanisms, enabling states and policymakers to inform decision-making and pursue claims to sovereignty.

The Philosophy of good living was used not only to provide a more equitable approach to the resources and a great decision-making power to marginalized groups, but in many cases, they were used as counter-hegemonic strategies for decolonization and a mechanism for protection of cultural landscapes (Kayira, 2015). While these cosmovisions are often poorly understood and not always respected by dominant elites and legal functionaries of the state, they serve to ensure people's well-being sustained on the lands they call home (Hoekema, 2017), e.g., in China, villagers' collective identity and a reinvented clan system was restored when villages united to resist land deprivation and rural identity (He & Xue, 2014).

The philosophies of *Buen vivir* across literature point to the view that humans are a part of nature and directly affected by it, inherently creating a level of responsibility towards each other and future generations. However, the practical application of these cultural philosophies faces challenges. Some neoliberal countries, totalitarian governments, corporate businesses, and enterprises abroad have led to the destruction and depletion of IPLC lands, territories, sacred places and the values associated to them. A large component is due to free- trade regimes as well as the non-binding nature of the International Labour Organization's convention 169 (ILO 69) and the United Nations declaration on the rights of indigenous people (UNDRIP). In Tamil Nadu, India, small-scale fishers have to compete for resources and space with expansionary large-scale fishing fleets. In the Amazon region, although the recognition that indigenous peoples' land rights are inalienable, the land was nevertheless used as collateral by the Peruvian government. Another problem is the reliance on values that tend to be interpreted as traditional. This colonial viewpoint that consists of the other or of the "noble savage" where a timeless rural peasant or indigenous "superhero" lives "in nature" and is resistant to the temptations of capitalism or novel technologies, are brought to light (Bold, 2017). Rather than interpreting the philosophies of good living as a remedy to the crisis of capitalism, it is important to draw on them as lenses testifying to humanity's cultural wealth and creative genius that can assist in addressing problems in social development and biodiversity degradation, inclusive of all voices and perspectives (Cochrane, 2014; Espinosa, 2017).

Relying on the philosophies for acknowledgement of local and traditional governance, for pushing the limits of government discourse, and strengthening global to local advocacy and activism that recognizes territoriality has been fundamental for a number of indigenous and local communities. Justice and territorial rights mean having the ability to choose, create, resist, reject, and change laws and policies that affect one's life and community, and inherent within the diverse philosophies of a good life, exists the notion that to pursue a good life, one must be free to live according to one's aspirations (Cadieux-Shaw, 2017). Finally, territories and rights are needed for the survival of IPCL, they need their cultural space to live out their lives.

4.4.4 Values revealed in decisions related to livelihood strategies linked to agrobiodiversity

The struggle of IPLC to defend their agri-food systems has emphasized the importance of agrobiodiversity conservation as one of the pillars of food sovereignty. Numerous studies point out that agrobiodiversity conservation reveals values of nature that address complementarity of agricultural cycles and can be key to meeting food challenges (Labeyrie *et al.*, 2021; Lazos, 2013; Thompson & Stinnett, 2018; Zimmerer *et al.*, 2019). The reasons why farmers use and maintain a diversity of seeds and crops and how they manage this biodiversity in their fields are strongly linked to their values. These values can contribute to adapt biodiversity conservation actions to local contexts, and support sustainable practices that benefit farmers, society and the environment. Diverse values are at stake in farmers' decisions related to crop biodiversity. A classification system of values based on farmers' local knowledge, visions, value systems and its interactions with global drivers was built.

Farmers' valuations of agrobiodiversity across the world (e.g., orchards in France, potato park in Peru, paddy fields in Iran and Myanmar, etc.) reveal four domains. (i) The socio-cultural domain includes the social significance and cultural role of agrobiodiversity. This domain encompasses the intangible dimension –spiritual and emotional aspects – of the relationship between communities and plants, highly linked to broad and relational values (see Chapter 2). For example, the concept of respect is central in the relationship between the Peruvian farmers of the potato park and the potatoes (Angé *et al.*, 2018). (ii) The crop characteristics domain relates to the morphological, physiological or phenological characteristics sought by farmers in their crops, linked to what Chapter 2 mentions as intrinsic, instrumental and life support values. Thant *et al.* (2020) showed that not only yield but resistance to harsh environmental conditions, along with cooking time, taste, aroma, and stickiness of the cooked grain, are all important values conveyed by farmers. (iii) The economic domain refers to the financial and non-financial valuations related to the means of subsistence, as the needs of rural households, including income, workload and uses of crops, linked to

instrumental values as mentioned by Chapter 2. Nordhagen *et al.* (2017) show that self-sufficiency is a major value for a group of farmers in Papua New Guinea, and Mary *et al.* (1999) demonstrate that workload and multifunctionality are determinant in the choice of growing dual-purpose (fruits and wood) walnuts in the Dauphiné region in France. (iv) The ecological domain includes all the interactions with the surrounding environment, including other crops, pollinators, soil erosion, prevention of natural hazards, habitat provision for wildlife or contribution to a healthy environment, linked to life support values as mentioned by Chapter 2 (Bardsley *et al.*, 2019; Marzban *et al.*, 2016; Mellon-Bedi *et al.*, 2020; Nordhagen *et al.*, 2017).

The articles reviewed[8] show the importance of the multiple socio-cultural, ecological, economic and agronomic valuations at stake in the decisions made by farmers regarding various levels of agrobiodiversity. Even in industrialized, low-diversity systems, farmers recognize a diversity of values (Cutforth *et al.*, 2001). All articles reviewed point out the various links between the domains of valuations of agrobiodiversity. In Myanmar (Thant *et al.*, 2020), local varieties of rice are preferred not only because they have appreciated culinary qualities, but also because they are adapted to local environmental constraints such as salinity and are resistant to climatic stresses such as heavy rain. They are appreciated because of their competitiveness (high tillering), and they are less likely to shatter or lodge; they also give high straws that are used as animal fodder. These findings highlight the need to consider values as intricate elements of a system and not as juxtapositions of individual motivations. While policies may consider farmers through the prism of economic agents, the results show that multiple levers of actions may be needed to support agrobiodiversity.

Besides farmers' values, various drivers acting at different scales can influence trends in agrobiodiversity. The evolution of political and socio-economic contexts can indeed favour or hinder the expression of these values. Global processes such as market integration are one of the factors driving a decline in the number of farmers and a homogenization of the crops grown globally (Khoury *et al.*, 2014) but do not have the same effect at all scales (**Boxes 4.5** and **4.6**). In some systems, the promotion of cash crops, producing high yields under intensive and mechanized practices, have led to sharp declines in local crop and wildlife diversity. The agrobiodiversity in Central Himalaya – where 40 species and various landraces were grown in traditional systems – was eroded by cash crops such as rice or wheat (Maikhuri *et al.*, 1997). In the Andes (Hellin & Higman, 2005) or Nepal (Upreti & Upreti, 2002), historical trends of agrobiodiversity loss are linked to market transformation. The clashes between instrumental and relational values are driven by different actors. Agrifood industries have the power to decide which varieties enter the market and this process forces farmers to change their crops and to reduce their agrobiodiversity. National and regional policies can lead to agrobiodiversity loss, through encouraging cultivation of cash crops, as did many colonial policies (e.g., peanut promotion in Senegal; Lericollaís, 1987) and the "green revolution" (e.g., agrochemical intensification of monocultures in Asia, Snapp

8. Literature review on values articulated in agrobiodiversity management (https://doi.org/10.5281/zenodo.4394547)

Box 4 5 Beneficial synergies between cultural values, local organizations and national policies (Moore, 2013).

Japan has experienced a considerable decrease in soybean production due to the liberalization of the market and the importation of cheaper American soybean. However, relational values linked to the diversity of food preparations requiring various qualities of soybeans has effectively contributed to maintain the cultivation of 59 local landraces. The production of local, diverse soybean was then supported by the confluence of two movements: (i) a growing concern of consumers for the traceability of products, which promoted the organization of direct local supply chains and labels, and (ii) a support from the government for the environmental benefits linked to the national production of soybeans.

Box 4 6 Domesticated forest as ecological intensification of non-timber forest products.

Contested claims between local communities and forest authorities in Indonesia over the agroforest into which swidden-fallow systems had evolved, the forest-like appearance of the Repong systems with a non- domesticated tree *(Shorea javanica, damar)* that started as shaded coffee gardens became an eye-opener that forest policy change was needed. Emerging recognition as "domesticated forest", -high diversity of native and planted trees, farmer- managed natural regeneration and based on human-nature relations- has challenged existing terminology that maintains an agriculture-forestry values dichotomy (Michon *et al.*, 2000).

et al., 2010) (see **Box 4.6**). Labeyrie *et al.* (2021) reported abandonment of subsistence cereals in response to climate change and market demand; and adoption of mainly irrigated horticultural cash-crops, notably in Africa. Changes in nutritional inputs and mismatch between climate change and crop demands may undermine future food security and farmers' capacity to adapt to climate change.

However, interactions between global and local forces can lead to different outcomes in farmers' fields. The mobilization of indigenous and non-indigenous knowledge, the multiple uses of crops, and organizational knowledge can guarantee the maintenance of agrobiodiversity (Zimmerer, 2013). Brown (2013) showed that in the loss of maize genetic diversity in Mexico, local initiatives of Chiapas communities of resistance against genetically modified organisms, allowed *in situ* conservation of local landraces, thanks to indigenous and scientific expertise. The existence of local movements and institutions in the defence of agrobiodiversity is essential to ensure community empowerment (Zimmerer *et al.*, 2019) (see **Box 4.5**).

At the community scale, the articles reviewed show that decision-making is influenced by individual characteristics such as gender, education or age and thus knowledge and power relations (Mary *et al.*, 1999; Mellon-Bedi *et al.*, 2020). Thus, while women are at the heart of the production of certain crops, such as groundnut in Burkina Faso, they have more complex and limited access to land, tools and knowledge (Kerr, 2014; Sinare *et al.*, 2021). Household characteristics such as socio-economic status is another important local driver. Nordhagen *et al.* (2017) show a diversity of profiles existing among the farmers of Papua New Guinea with the power control linked to the possession of a great diversity of plants.

4.4.5 Conclusions

There is evidence that suggests that while market values distort social and cultural values, reemphasizing socio-cultural values can serve as an appropriate framework for human well-being, for effective environmental initiatives, and for improving the quality of life. Social and environmental governance that promotes the balanced life is gaining popularity as a culture, language and heritage safeguarding principle. Research shows that numerous policies and colonial processes have caused indigenous peoples and local communities to disproportionately experience ill-health, poverty, dispossession, and diminishment of cultural elements. In many cases, cultural expressions have been outlawed and rendered illegal, creating a break in the transmission of cultural philosophies such as that of what constitutes a good life. As attempts at decolonization and revival of IPLC cultures are increasingly growing, communities and families are seeking a return to a good life geared towards linguistic and cultural transmission that is based on justice. Research shows that clearly defined programs and policies based on the epistemological principles of a good life are assisting IPLC communities in revitalizing their self-determination.

It is important to point out that while indigenous peoples potentially have much to gain from resource development within their territories, they also face the highest risks to their health, economy, and cultural identity from any associated environmental degradation. The Philosophies of good living reveal a number of values including the attempts at protecting their survivability as a cultural group living in coexistence with nature (Calbucura & Almonacid, 2019) and empowering their communities (Fabri & Floriani, 2020) for mobilization to protect their culture, territory and interests (Quick & Spartz, 2018). A total of 85% articles in this literature review identified that the cultural philosophies of good living have served as a vehicle for culture and decision-making. The philosophies of good life were used as tools to ensure heritage and cultural places sustained by bringing the periphery-center closer, by supporting legal pluralism (Pawlowska-Mainville, 2021). Empowering local ways of knowing (including "indigenous science") and bringing to the center local histories, repositions the relationship between nature, the cosmos and humans. The philosophies reveal that protection of sacred and cultural territories is increasing in importance for intergenerational connectedness, addressing heritage and sacredness.

While all cultures have an interpretation of what constitutes a good life, when it comes to heritage, specific geographical places, especially those with a sacred element ascribed to them, are often tied to identity and cultural well-being. Such places and spaces serve as mnemonic devices for a way of life that IPLC aspire to protect, promote, and strengthen. It is also found that when heritage elements are supported and valued rather than replaced with market values as the cornerstone of societies and decision-making, the philosophies of good life serve as an element of heritage that can redirect values sourced from heritage to more effectively support territories with exceptional emotional wealth. Sourced from heritage then, these intellectual processes and worldviews illustrate that contemporary values associated with individualism, development, capitalism, and cultural imperialism are increasingly rejected. In that sense, when such cultural philosophies as *dolce vita* (Italian), *sumaq kawsay* (Quechua), dobrobyt (Polish), *mauri ora* (Maori), *ubuntu* (diverse African nations), or *satoyama* (Japan), are evoked they form *significative* learning promoting endogenous alternatives for liberation (Kaya & Chinsamy, 2016; López Valentín *et al.*, 2020).

4.5 THE ROLES OF VALUES, KNOWLEDGE, AND POWER IN SHAPING DECISION OUTCOMES

4.5.1 Introduction

Current institutions reveal the values that have historically shaped and continue to shape decisions. Decision-makers would benefit from understanding how, given their current political realities and a variety of constraints, they can ensure more sustainable and just outcomes of their decisions. Based on the diverse values of nature and its contributions to people, one might expect that a more diverse expression and inclusion of these values in decisions could lead to better outcomes for nature and people. However, merely including diverse values may or may not translate into improved decisions: much depends on the structure and functioning of the decision-making process, including the voice given to under-represented groups and values, the types of knowledge included, and attention to procedural justice.

The impact analysis literature conventionally distinguishes between "outcomes" resulting directly from the decision (in terms of actions taken), and the consequent "impacts" on society and the environment (Belcher & Palenberg, 2018; Harding, 2014). This distinction is often important, but in this section, as throughout the chapter and the assessment, the term outcome is used to describe both. Outcomes are reviewed in four emblematic decision contexts that span a range of human interactions with nature: protected areas, payments or compensation for ecosystem services programs (PES/CES), commodity sustainability certification programs, and big (environmentally disruptive) development projects such as mining and dams. These decision contexts are among the best researched in the outcomes literature, are well represented across the world, and provide a contrasting set of examples from which to draw conclusions about how values, knowledge, and power shape decision outcomes.

Outcomes were grouped into categories according to the IPBES conceptual framework, including the following elements: nature, nature's contributions to people, and good quality of life (encompassing socio-cultural, economic, and other material dimensions) **(Figure 4.9)**. In addition to these categories, "social conflicts" (related to power struggles between groups of people, not human-wildlife conflict which is here considered under the category 'nature's contributions to people') have overarching implications for justice and sustainability. 'Values transformation' (the extent to which preferences, principles or worldviews change or evolve as a result of the decision) is addressed for payments for ecosystem services alone in a separate section, due to the complexity of the topic and limited evidence across decision contexts. Consistent with the rest of the assessment, the definition of sustainability does not merely describe any positive environmental outcomes as "sustainable" but considers whether social, cultural, and environmental gains have been or are likely to be maintained over the long-term. The three dimensions of justice defined in Chapter 1 (distributive, procedural, recognition) feedback to influence other outcomes, and also constitute significant outcomes in themselves (He & Sikor, 2015; Martin *et al.*, 2014; Pascual *et al.*, 2014; Sikor *et al.*, 2014).

Two main methods were used to assess outcomes for all four decision contexts: (i) review of 'literature reviews' to establish the evidence base for outcomes in the decision contexts; and (ii) in-depth, site-specific case studies (i.e., a protected area[9], a payment for ecosystem services program[10], a mining or dam project[11]) involving review of literature on that site, providing additional context on decision processes as well as impacts **(Figure 4.10)**. Through these deep cases it is possible to trace back to the conditions under which different outcomes occur as well as the feedback among outcomes, while the broader review of reviews makes it possible to examine general trends and gaps in the literature. Due to the larger evidence base, both protected areas and payments for ecosystem services were able to apply both methods, while sustainability certification employed mainly the literature review approach[12], and big infrastructure project developments were examined via case studies with the best-documented evidence.

The guiding aim across the sub-sections is to understand the conditions under which the inclusion of diverse values in decisions results in improvements in sustainability, justice, and overall well-being, with the understanding that values are embedded in and articulated through knowledge systems and institutions. For each topic, the types of outcomes (on people and nature) commonly documented in the literature are assessed, and the outcomes of decisions in these different contexts are analysed to answer the following questions (summarized in **Figure 4.9**):

1. Whose and which values are included in decisions?

2. What types of knowledge inform the decision, and how are diverse forms of knowledge integrated?

9. Literature & case study review on outcomes in protected areas and indigenous and community conserved areas (ICCAs). (https://doi.org/10.5281/zenodo.4394267).
10. Literature & case study review on outcomes in payments for ecosystem services / compensation for ecosystem services (PES/CES) programmes (https://doi.org/10.5281/zenodo.4394520).
11. Review on outcomes in big development projects (mining and dams) (https://doi.org/10.5281/zenodo.4395985).
12. Literature review on outcomes in environmental certification (https://doi.org/10.5281/zenodo.4394498).

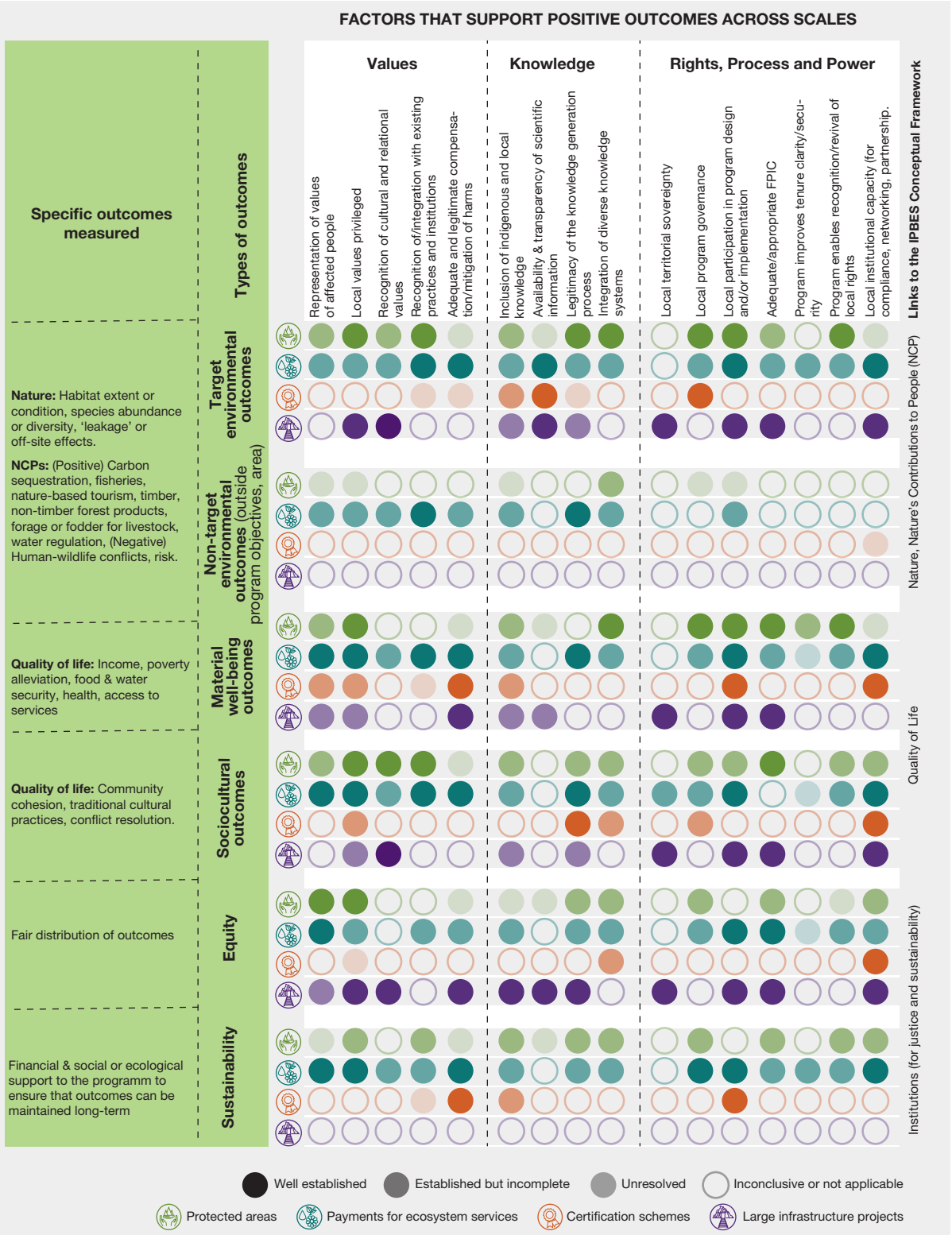

Figure 4 9 **Outcomes influenced by values, knowledge and process in decisions.**

Filled circles indicate evidence for a positive influence of the variable (related to values, knowledge, and process, listed in the columns) on the outcome (related to elements of the IPBES Conceptual Framework: nature, NCP, good quality of life, and institutions for justice and sustainability; listed in the rows). Evidence comes from literature review and case studies for protected areas (green), payments for ecosystem services (teal), certification schemes (orange), and large infrastructure projects (purple). The darkness of the shade of the respective colours indicates the level of evidence supporting (from well established in the darkest shade to inconclusive in the lightest shade).

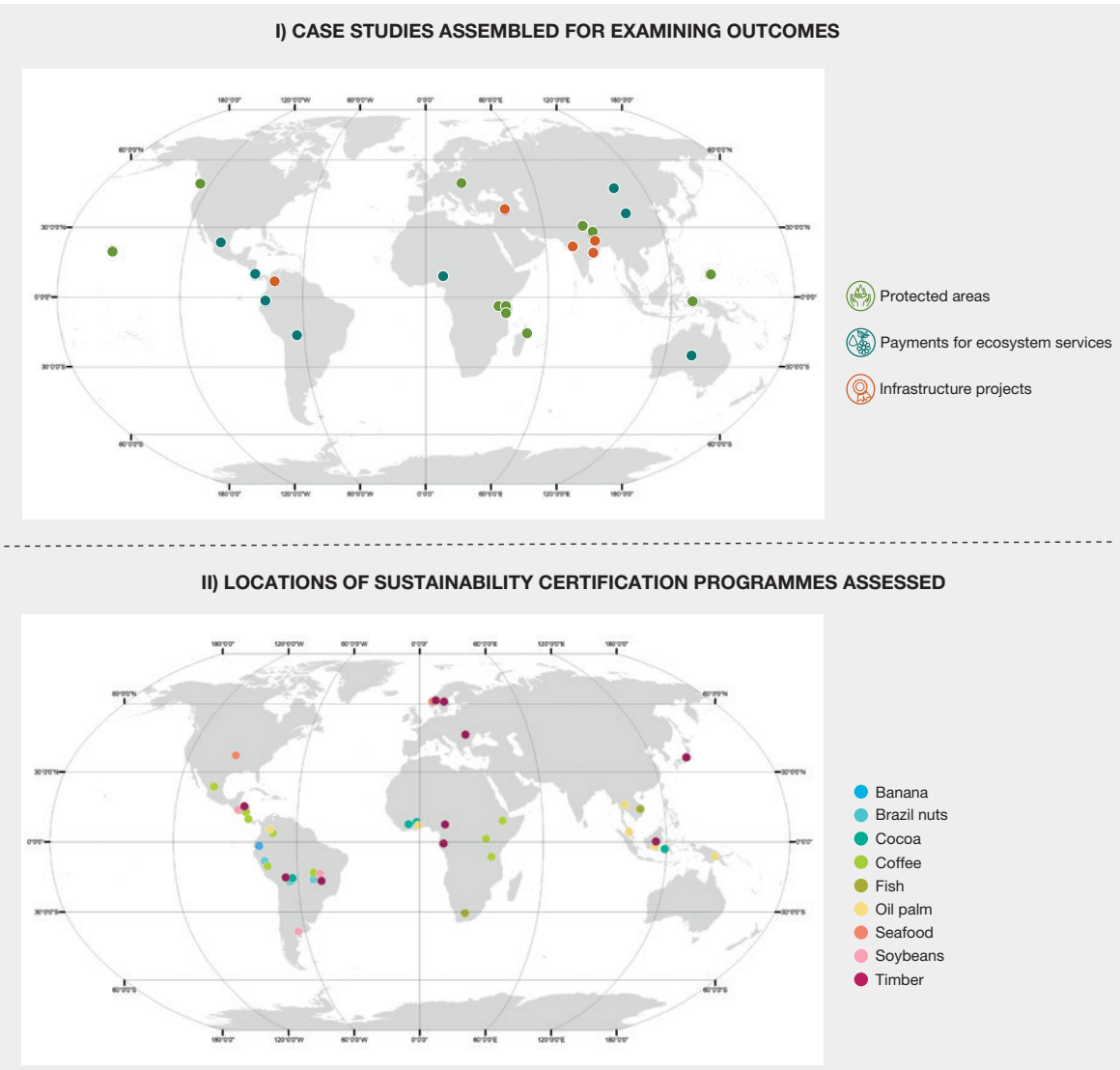

Figure 4 10 **Case studies assembled for examining outcomes in protected areas, payments for ecosystem services and infrastructure projects (i), and locations of sustainability certification programs for different commodities (ii).**

3. How are diverse actors represented in the decision process, and how are they empowered (or not)?

Particular attention is paid to local values, those values held by local people impacted by the decision, especially the values of historically under-represented local people, and the extent to which they are included or excluded from the decision process. Under-represented values are also given special consideration, the types of values that do not typically drive decision-making in existing institutions (see 4.3) – principally non-market values for nature, including intrinsic and relational values. This varies depending on the decision context and the institution; for instance, protected areas are traditionally concerned with intrinsic values for nature, at times marginalizing relational or instrumental values for local people. Values of historically under-represented people refer to all specific values (instrumental, relational, and intrinsic) that may be held or expressed by groups that are less often included or consulted in dominant decision processes, including IPLC, and who may also bear inequities in the broader social context. Therefore, a context-specific approach is taken to define under-represented values and values of under-represented people for each case.

Where documented, the degree to which plural valuation was employed is considered in the case studies. In keeping with the rest of the assessment (see Chapter 1 and Chapter 3), plural valuation is defined as practices designed to elicit a range of values (broad or specific) and knowledge

appropriate to the diversity of a given decision context, with the aim of increasing legitimacy, justice and robustness of valuations (Jacobs *et al.*, 2020; Zafra-Calvo *et al.*, 2020). Valuation may also be considered more plural if it mobilizes a diversity of methods and integrates diverse knowledge systems. Key here is the adequacy of a given approach to the diversity of the context; therefore, it cannot be said in advance that more plural valuation is necessarily desirable. Specifically, this section looks for plural valuation insofar as it facilitates the inclusion of under-represented values and values of under-represented people. Plural valuation has the potential to enhance outcomes across the three dimensions of justice by establishing participatory processes that empower local stakeholders to represent and integrate their values into decisions, utilizing methods rooted in diverse knowledge approaches, and better harmonizing program design and implementation with existing formal and informal institutions (see Chapter 3).

4.5.2 Protected areas

4.5.2.1 Outcomes

The two most frequently-studied outcomes, across a large body of literature on protected areas (482 study-site units) are associated with nature and quality of life (see **Figure 4.9**).[13] Outcomes for nature are most frequently related to ecosystem extent or condition, and species abundance and richness; much more rarely are the spill over effects of the protected area reported (e.g., displacement of habitat conversion to surrounding areas). Impacts on quality of life, on the other hand, are much more diverse, ranging from livelihoods, poverty and other economic conditions to displacement and change of social conditions resulting from displacement, reproductive health and disease control, recognition of indigenous peoples' rights, perceptions of benefits and burdens borne by local stakeholders, satisfaction, and other subjective well-being measures. Impacts on institutions include the creation of new programs or structures enabling broader participation in protected area management, or institutions beyond the protected areas themselves that facilitate social cohesion, conflict resolution, knowledge sharing and formal education opportunities.

A subset of studies that included only rigorous impact evaluations (53 studies) demonstrate mostly positive environmental outcomes and mixed social outcomes for protected areas[14]. This review of outcomes is restricted to such rigorous studies (except for case studies or where otherwise noted, to offer additional insight), because it has been well documented that without using counterfactual methods to establish impact, the effect size may be overstated (Ribas *et al.*, 2020). More than 70% of studies documenting win-wins (net positive outcomes) were typically between nature and nature's contributions to people or nature and quality of life. The 27% of studies that demonstrated trade-offs (net negative or net neutral) were mainly between nature and quality of life, and also mostly focused on forest cover and economic impacts (poverty, *per capita* income and expenditure, income growth, revenue, perceived change in remittance, and perceived change in income). None of the reviewed studies found trade-offs between nature and nature's contributions to people, despite the potential for negative contributions from nature (such as livestock predation, disease risk, etc).

4.5.2.2 Values

The evidence for how values influence outcomes in protected areas comes from the in-depth case studies tracking the decision process and evolving conditions in protected areas over time[15] **(Figure 4.9)**. Lessons can be learned from negative outcomes seen in the older protected areas, which were all established through colonialist or top-down approaches (Royal Chitwan National Park in Nepal, Tarangire National Park in Tanzania, Masoala National Park in Madagascar, Nanda Devi Biosphere Reserve in India). Establishment of these older protected areas often involved colonial powers or international actors who removed indigenous peoples from their territories, which has left a legacy of mistrust that has been difficult to overcome even with recent transitions to more community-based management (Dongol, 2018; Goldman, 2003; Igoe, 2002; Keller, 2015; Llopis *et al.*, 2019; Singh & Singh, 2004). In all four of these cases, outside values for biodiversity were prioritized over local community values, and these cases demonstrate mixed or negative impacts, even for nature. The most negative were in Nanda Devi (Maikhuri *et al.*, 2000), which maintained forest cover within the protected area but displaced land degradation outside, leading to a doubling of livestock densities and cultivation of cash crops and consequently caused much higher rates of soil erosion, with a range of negative social outcomes (material well-being, health, cultural heritage, spirituality). Other case studies demonstrated a loss of different aspects of security (water security and land tenure in Tarangire (Baird *et al.*, 2009; Miller, 2015); concerns about food security in Masoala (Borgerson *et al.*, 2019; Llopis *et al.*, 2020) or a loss of identity (for example, due to forced relocations and an influx of tourism in Chitwan (Lipton & Bhattarai, 2014) and to limitations on expansion or shifting cultivation of rice farming in Masoala (Keller, 2008; Llopis *et al.*, 2021)). Problems from

13. Literature & case study review on outcomes in protected areas and indigenous and community conserved areas (ICCAs). (https://doi.org/10.5281/zenodo.4394267).
14. Literature & case study review on outcomes in protected areas and indigenous and community conserved areas (ICCAs). (https://doi.org/10.5281/zenodo.4394267).
15. Literature & case study review on outcomes in protected areas and indigenous and community conserved areas (ICCAs). (https://doi.org/10.5281/zenodo.4394267).

human-wildlife conflicts were poorly compensated (Baird, 2014; Maikhuri *et al.*, 2000; Newmark *et al.*, 1994) or even exacerbated (Bolton, 1975). In several of these case studies, these negative impacts have led to social conflicts between protected area authorities and local communities (Chitwan, Nanda Devi, Tarangire), and growing resentment or even hostility (in Nanda Devi) has undermined conservation goals (Baird & Leslie, 2013; Lamichhane *et al.*, 2019; Nepal & Weber, 1995; Newmark *et al.*, 1993; Rao *et al.*, 2003; Singh & Singh, 2004).

In contrast, cases for indigenous community conserved areas and territories (ICCAs) and marine protected areas (which resemble ICCAs in their local management) can be seen as conservation success stories, demonstrating how conservation practices that protect or restore local values and livelihoods are much more likely to be legitimized locally and actively supported over the long term. Some ICCAs in Hawai'i are based on local stewardship values such as *'lawai'a pono'* (caring for fisheries and only taking what you need); while often at odds with (and stricter than) regulation set by the United States government, these values are manifested in the striking recovery of culturally important species like reef fish and waterbirds (Delevaux *et al.*, 2018; Vaughan *et al.*, 2017). Similarly, the Digo-speaking Majikendi people practiced sustainable resource use for millennia and their Kaya Kindondo sacred community forest in what is now Kenya is more than 600 years old (Kihima & Kimaru, 2013). The Gorale goat-herding communities in the Polish Tatra Mountains, as well as the Tla-o-qui-aht Nuu-chah-Nuulth in Canada exemplify similar stewardship values by local peoples (Borucki, 2004; Mroczkowski, 2006; Murray & Burrows, 2017; Worboys *et al.*, 2015). Ulithi Atoll Marine Managed Areas (in Federated States of Micronesia) and Raja Ampat Marine Reserve (in West Papua, Indonesia), were both local-led endeavours, putting local values and voices at the center of protected area design and management, and both have documented increases in fish biomass and reef health, as well as on quality of life measures related to economic well-being, health, and education (Andradi-Brown *et al.*, 2017; Crane *et al.*, 2017a; Crane *et al.*, 2017b; Mangubhai *et al.*, 2012; Purwanto *et al.*, 2021).

Values included in (or excluded from) decision processes are in sharp contrast between case studies of protected areas with positive and negative outcomes. Values included in protected areas with positive impacts are almost uniformly more local, often recognizing otherwise under-represented voices, even if they are not necessarily more pluralistic. Instrumental values for indigenous peoples and local communities (focused on "sustainable use") tend to dominate in marine protected areas, but relational values expressed by those communities are also important, especially in the ICCAs. Instrumental and relational values are expressed in the case studies that had negative outcomes as well, but often ignored or deprioritized; intrinsic values of biodiversity were often the primary focus (or in the case of Nanda Devi, the sole focus; Singh Rana *et al.*, 2003). Supporting this case-study evidence, Naidoo *et al.* (2019) showed (across >600 protected areas within 34 developing countries) that communities living near protected areas with greater allowance for sustainable use led to significantly better social outcomes (on stunting, height-for-age, poverty, and household wealth) than living near "strict" protected areas (IUCN classes I-IV) that restrict local access. While this synthesis was obviously not able to examine values entering into the decision process itself, it can be inferred that if multiple uses are allowed within protected areas a greater representation of the diverse values of nature within those areas exists than if no uses are allowed. In particular, the analysis of the literature identified that protected areas that allowed tourism and local access to harvest plants and animals had the most positive social outcomes, which is consistent with case study findings underscoring the importance of recognizing local instrumental values alongside intrinsic values of biodiversity.

4.5.2.3 Knowledge

Positive outcomes are seen in protected areas where local communities and local experts collaborated with outside experts to blend scientific and local knowledge. Adaptive management is more successful when local actors are involved in the development and evaluation of the effectiveness of their management plans in an iterative process (e.g., in Ulithi Atoll; Agostini *et al.*, 2012; Purwanto *et al.*, 2021). Integrating local knowledge into economic valuation can improve environmental and social outcomes even for reserves established by outside actors (e.g., as observed in the benefits-sharing arrangement in Jozani-Chawaka Bay Conservation Area in Tanzania; Saunders, 2011). Local knowledge can also be seen as a requirement of sustainable use (as seen in Hawai'i, by banning gear that would allow people to fish with little skill or experience; Vaughan *et al.*, 2017). In contrast, in the four cases documenting negative outcomes described above, scientific knowledge was used to the exclusion of indigenous and local knowledge (even if research was very scarce, as in the case of Nanda Devi; Tiwari & Joshi, 2009).

4.5.2.4 Decision-making processes, power relations, and institutions

In the impact evaluation reviews, win-win outcomes for people and nature in protected areas were primarily attributed to a greater degree of community involvement in decision-making. Leverington *et al.* (2010) showed, across more than 3,000 terrestrial and marine protected areas worldwide, the importance of institutional enablers such as community and stakeholder involvement, the communication program, and appropriateness of programs for community benefit. Likewise in 40 marine reserves across

the Philippines, community participation in determining the precise size and location of the protected area as well as financial or material inputs from municipalities were key (Gjertsen, 2005). This is also exemplified in the case studies presented: positive outcomes are seen in marine protected areas with deeper community engagement throughout both the design and management processes, especially where local villages still maintain some authority (either entirely, for Ulithi and Raja Ampat (Brown *et al.*, 2020; Crane *et al.*, 2017a; Mangubhai *et al.*, 2012; Pakiding *et al.*, 2020; Purwanto *et al.*, 2021), or over the buffer zones for Jozani (Saunders, 2011)), while negative or mixed outcomes are associated with more cursory involvement of local people, who, to the extent that they were involved in the process at all, were treated as beneficiaries or stakeholders rather than as managers or stewards (in Chitwan (Nepal & Spiteri, 2011), Tarangire (Nelson *et al.*, 2010; Sachedina, 2016), Masoala (Keller, 2015; Kremen *et al.*, 1999), and Nanda Devi (Seaba, 2007)). Cursory or even coercive participation should not be mistaken for co-management, and indeed has been cited as one of the principal challenges faced by Madagascar in their transition to shared governance of their protected areas (Gardner *et al.*, 2018). Indeed, older research that has questioned the effectiveness of co-management merely confirms the importance of attention to enabling conditions such as institution building and approaches for managing inequities (Kellert *et al.*, 2000).

The importance of co-management or community-based management to outcomes appears to exceed that of the institutional aspects traditionally assumed to determine effectiveness. For example, adequacy and security of budget, management plans, boundary demarcation, control of inappropriate land use and activities, or capacities and resources of staff to enforce regulations and legislation were not strong predictors of protected area performance in the Amazon (Nolte & Agrawal, 2013). Further, in a comparison of the relative effectiveness of multiple forest conservation mechanisms (Börner *et al.*, 2020), greater effect sizes were seen for decentralized management than for top-down protected areas. One reason for the primacy of local communities in determining management success is local people may be better stewards if they feel their own interests are secure. While not screening for rigorous impact evaluations, Oldekop *et al.* (2016) reviewed 165 protected areas and found that win-wins between social and environmental outcomes were more likely to occur when protected areas *"adopted co-management regimes, empowered local people, reduced economic inequalities, and maintained cultural and livelihood benefits."* In fact, positive socioeconomic outcomes were more predictive of positive conservation outcomes than any physical or management characteristics of those protected areas. It is not surprising that social and environmental outcomes impact and interact with each other, and these dynamics deserve further research.

Given the importance of local involvement (if not autonomy) illustrated in these reviews as well as in the case studies, further investigation into community protected / conserved areas, including ICCAs, is critical. Börner *et al.* (2020) found indigenous management to be the most effective of all conservation instruments examined (including protected areas, payments for ecosystem services, and certification), but noted the low sample size required a cautious interpretation of this finding). While such local landscapes have been managed by local cultural knowledge and laws for millennia, it is only recently that these spaces have received *official* protection by conservationists or national authorities (Pawlowska-Mainville, 2021). There is little written documentation of many of these areas, as the spaces may be led by customary governance where management practices are passed down orally, or they may not have their management practices recognized. The defence of their territories is based on self-determination, biocultural conservation, reciprocity principles and the recognition of rights of nature (Acosta, 2016; Albó, 2018).

4.5.2.5 Conclusions

Across the case studies and the vast body of evidence from impact evaluation, it is clear that when local people are marginalized in decision processes, protected areas can cause social harm and the ability of these programs to achieve even their biodiversity goals is compromised. The key consideration seems to be not necessarily which values are included in decisions but whose; local and indigenous values and knowledge entered into the process too little and too late in protected areas with negative outcomes. Decision processes fostering co-learning and co-management, recognizing and respecting local stewardship values and knowledge, and sustaining the capacity for such stewardship by prioritizing positive social outcomes for local people, produce more sustainable (over the long term) and just (for different groups of people, and for non-human organisms) outcomes.

4.5.3 Payments for ecosystem services/compensation for ecosystem services programs

4.5.3.1 Outcomes

This analysis on Payments for Ecosystem Services (PES) or Compensation for Ecosystem Services (CES) programs included collective action funds (like water funds), reciprocal water agreements (e.g., in Bolivia), compensation for ecosystem services, and 'reducing emissions from deforestation and forest degradation' (REDD+) programs that may not self-describe as payments for ecosystem services, encompassing the diversity of payments for ecosystem services in practice.

The literature overwhelmingly emphasizes the importance of fit-to-context in shaping payments for ecosystem services outcomes. For this reason, this review and case study analysis focused on the mechanisms by which influencing factors affect outcomes, particularly focusing on alignments and misalignments between program design and local values, knowledge, and institutions[16]. Of the 39 papers reviewed, 27 (69%) identified causal mechanisms linking factors to outcomes for target ecosystem services, and an equal number did so for livelihoods 25 papers (64%) discussed causal mechanisms linked to program sustainability (including enrolment); 21 papers (54%) to sociocultural outcomes; 17 (44%) to equity; and 10 (26%) to other, non-target environmental outcomes. The evidence was roughly equal for positive and negative influencing factors. The review did not track broader discussions of outcomes in the literature where causal factors were not identified and did not track speculative claims about impacts on outcomes. Below, findings from the case studies augment the literature review, referenced by country **(Figure 4.10)**.

4.5.3.2 Values

There is strong evidence that greater integration of local values positively impacts outcomes, chiefly by enhancing enrolment (quantitative levels of program participation, and overall participant buy-in and perceptions of program legitimacy), reducing conflict, and more effectively addressing drivers of land conversion. Recognition of cultural values, equity goals, and prioritization of locally-relevant ecosystem services enhance enrolment, benefit sharing, monitoring, equity, and environmental outcomes (Bayrak & Marafa, 2016; Boerner *et al.*, 2017; Brownson *et al.*, 2019). Misalignments among local and program values weaken enrolment and may foment conflict, especially around land use restrictions, targeting, and benefit sharing (Nigeria, Mexico, Ecuador) (Blundo-Canto *et al.*, 2018; Corbera *et al.*, 2020; Isyaku *et al.*, 2017; Joslin, 2019; Odok, 2019; Osarogiagbon, 2011; Shapiro-Garza, 2013). Monistic valuation focused on single ecosystem service values can result in trade-offs affecting non-target environmental outcomes and traditional lifeways, including those that support biodiversity and food sovereignty (Bayrak & Marafa, 2016; Milne *et al.*, 2019; Costa Rica and Nigeria cases).

Non-monetary motivations, including social and political recognition and cultural values, are well-documented as important motivators for enrolment (Australia, Mongolia, Ecuador, Mexico, Bolivia; Bétrisey & Mager, 2014; Bremer, n.d.; Bremer *et al.*, 2018) in these case studies, co-designed payments for ecosystem services successfully incorporated these motivations into program design (Australia, Mongolia, Bolivia), while other programs made some improvements over time (Mexico, Ecuador). Even in co-designed payments for ecosystem services, difficulties remain in balancing cultural values and recognition with ecosystem services-driven policy and monitoring (Australia), and in controlling leakage without imposing culturally-inappropriate rules (Mongolia).

Insufficient or inappropriate compensation was the most-discussed benefit-sharing problem, rooted in non-recognition of local values, underestimation of participation costs, unreliable funding, and low-value ecosystem services (especially carbon). Strong evidence shows that insufficient or inequitable compensation results in negative social outcomes and threatens program effectiveness and longevity (Nigeria case; Bayrak & Marafa, 2016; Blundo-Canto *et al.*, 2018; Brownson *et al.*, 2019; Milne *et al.*, 2019; Pasgaard *et al.*, 2016; Pelletier *et al.*, 2016; Robinson *et al.*, 2019). Lack of participant engagement in payments for ecosystem services design may result in inequitable benefit sharing (Nigeria case; Loft *et al.* 2017), while participatory mechanisms enhance equity (Mongolia case; Brownson *et al.*, 2019). In contrast, payments that meet or exceed opportunity costs predictably enhance enrolment and program effectiveness (Blundo-Canto *et al.*, 2018; Calvet-Mir *et al.*, 2015; Ola *et al.*, 2019). Long-term contracts are also key to enabling enrolment and behaviour change (Boerner *et al.*, 2017; Calvet-Mir *et al.*, 2015; Grima *et al.*, 2016).

A variety of formal valuation methods and informal processes of valuing (as defined by Chapter 3) were used across cases, but there is little documentation of specific methods employed in payments for ecosystem services design. Economic valuation of ecosystem services did not play a strong role in any case, although a valuation study in Costa Rica was used to galvanize support for market approaches early on (see Lansing *et al.*, 2015). Estimated opportunity costs (Mexico, Costa Rica, China) and market values for carbon (Mongolia, Australia) were the primary means of determining compensation, in addition to government fiat (Nigeria) (Alix-Garcia *et al.*, 2008; Asiyanbi, 2016; Castro *et al.*, 2000; De Camino *et al.*, 2000; Jackson *et al.*, 2017; Upton, 2020). Community workshops and focus groups were used for value articulation in some cases (Australia, Mongolia, Nigeria), but their impact on design and implementation varied widely based on governance structure and power relations (Jackson *et al.*, 2017; Nuesiri, 2018; Upton, 2020). In Nigeria, despite nominal compliance with reducing emissions from deforestation and forest degradation (REDD+) safeguards, there was evidence that workshops deliberately excluded relevant stakeholders believed to hold views conflicting with reducing emissions from deforestation and forest degradation (REDD+) proponents. There, misalignment among carbon values

16. Literature & case study review on outcomes in payments for ecosystem services / compensation for ecosystem services (PES/CES) programmes (https://doi.org/10.5281/zenodo.4394520).

prioritized in reducing emissions from deforestation and forest degradation (REDD+) and instrumental, relational, cultural, and intrinsic values of forests held by communities resulted in resistance, conflict, and significant adverse social impacts. In some cases, where local values were not sufficiently represented, unofficial value articulation strategies like protest, sabotage, refusal, and resistance were used (Nigeria, Mexico, Ecuador; Diehn, 2005; Osarogiagbon, 2011; Shapiro-Garza, 2013). Cases with substantive community engagement in defining the land management problem (Australia, Mongolia) were best able to align values.

4.5.3.3 Knowledge

There is limited direct evidence in review literature on the role of diverse knowledge types in influencing outcomes. However, some studies show that integrating local traditional knowledge enhances benefit sharing and equity, and supports monitoring and environmental effectiveness (Bayrak & Marafa, 2016; Turreira-Garcia *et al.*, 2018). Effectiveness refers to the ability of a program to deliver its intended results, e.g., additional ecosystem service/nature's contributions to people values, while controlling displacement of degrading activities (leakage). Efficiency refers to a program's cost-effectiveness relative to alternative options (Pasgaard *et al.*, 2016). In contrast, restrictive interventions counterposed to local knowledge and management practices may lead to loss of the latter, including those supporting biodiversity (Bayrak & Marafa, 2016; Bremer *et al.*, 2018); and may foment conflict and erode social cohesion (Blundo-Canto *et al.*, 2018). Community-driven programs in Mongolia and Australia successfully integrated indigenous and local knowledge and mainstream science, using tools like carbon modelling to align local and non-local values. These processes were substantially community-driven, supported by well-organized local institutions, and time-consuming (Jackson *et al.*, 2017; Upton, 2020). In national and user-driven programs, there was greater dominance of geospatial science in defining interventions, at times at the expense of local values, knowledge, and rights (Nigeria, Mexico; Asiyanbi *et al.*, 2017; Muñoz-Piña *et al.*, 2008; Shapiro-Garza, 2020). Certification requirements also played a role: in Mongolia, the plan vivo carbon standard set ambitious requirements for community-driven design and equitable benefit sharing, while reducing emissions from deforestation and forest degradation (REDD+) free, prior, and informed consent (FPIC) standards in Nigeria failed to ensure procedural justice (Asiyanbi *et al.*, 2017; Isyaku *et al.*, 2017; Upton, 2020).

There is greater evidence in review literature on the importance of participants' knowledge and understanding of program goals and benefits in supporting enrolment, compliance, and program effectiveness (Adhikari & Agrawal, 2013); of adequate contextual and technical knowledge by intermediary institutions (Ola & Benjamin, 2019; Tacconi *et al.*, 2013); and of knowledge enhancement and training via participatory monitoring for building capacity and program longevity (Pelletier *et al.*, 2016; Turreira-Garcia *et al.*, 2018). Inadequate or inappropriate consultation processes, even where these satisfied certification requirements for free, prior, and informed consent, resulted in confusion about the program and goals, diminishing enrolment and at times leading to loss of land rights (Bayrak & Marafa, 2016; Duchelle *et al.*, 2018; Lawlor *et al.*, 2013; Milne *et al.*, 2019; Nigeria case).

4.5.3.4 Decision-making processes, power relations, and institutions

Institutional alignment refers to how well-integrated payments for ecosystem services programs are with the broader policy context and existing institutions. Review literature provides strong evidence that integration with existing local organizations and trusted intermediaries is a key factor in program success across outcome dimensions, particularly for program effectiveness and sustainability (Bremer *et al.*, 2018; Brownson & Fowler, 2020; Hayes *et al.*, 2019). In contrast, weak institutional capacity and inequitable local institutions inhibit monitoring, enforcement, and behaviour change (Brownson *et al.*, 2019; Samii *et al.*, 2014; Wegner, 2016). Conflicting policy and political economic incentives weaken compliance and effectiveness (Loft *et al.*, 2017; Milne *et al.*, 2019; Ola & Benjamin, 2019).

Institutional alignment is especially relevant to understanding the role of land tenure formalization in payments for ecosystem services, a strong focus of the literature. In contexts with overlapping or unformalized land rights and customary uses, or high state ownership of land, land tenure codification – commonly considered to be a benefit to participants – may increase land scarcity, conflict, and 'leakage' (Kansanga & Luginaah, 2019; Milne *et al.*, 2019; Nigeria case), or it may undermine traditional institutions and weaken IPLC decision-making power (Bayrak & Marafa, 2016). Tenure criteria for participation may also exclude non-landowners and thus exacerbate contextual inequities (Bolivia case; Duchelle *et al.*, 2018; Koch & Verholt, 2020; Loft *et al.*, 2017; Robinson *et al.*, 2019). In contrast, where well-organized community institutions are engaged, formalizing communal land rights may strengthen communities' ability to access, manage, and sell environmental goods (Mongolia case; Brownson *et al.*, 2019; Chhatre *et al.*, 2012).

Studies also show the importance of alignment with existing practices and cultures of resource management (informal institutions embodying community shared values) for social outcomes, including equity (Bremer *et al.*, 2018; Calvet-Mir *et al.*, 2015). This accords with strong evidence showing that working lands interventions are more effective

than diversionary approaches for building local capacity, enrolment, and program longevity (Ola *et al.*, 2019; Tacconi *et al.*, 2013; Wegner, 2016). In Australia and Mongolia, the revival and enhancement (respectively) of traditional land management practices and empowerment of local institutions served as powerful motivators for enrolment (Jackson *et al.*, 2017; Upton, 2020). In contrast, in Nigeria reducing emissions from deforestation and forest degradation (REDD+) incentives were part of a "carrot and stick" approach that effectively criminalized livelihoods, resulting in significant negative livelihood impacts, local resentment of reducing emissions from deforestation and forest degradation (REDD+), and mass incarceration among forest-dependent communities (Isyaku *et al.*, 2017).

Strong evidence shows that local participation in payments for ecosystem services design, implementation, and monitoring enhances social and environmental outcomes and strengthens governance institutions (Mongolia, Australia; Boerner *et al.*, 2017; Brownson *et al.*, 2019; Chhatre *et al.*, 2012). However, the degree of participation matters: one review of participatory environmental monitoring cautions that participation is often limited to data collection and is routinely un- or under-compensated, weakening its social, environmental, and program benefits (Turreira-Garcia *et al.*, 2018). Participatory mechanisms are most effective when integrated across ideation, design, implementation, and monitoring, and supported by strong community institutions or trusted intermediaries (Australia, Mongolia; Adhikari & Agrawal, 2013; Boerner *et al.*, 2017; Brownson *et al.*, 2019; Duchelle *et al.*, 2018; Tacconi *et al.*, 2013). In Australia and Mongolia, participatory design and management was enabled by significant community control over land use (70% Aboriginal ownership in Australian case) (Russell-Smith *et al.*, 2009). Local decision-making around implementation proved especially significant in aligning values and enhancing enrolment (Australia, Mongolia, Ecuador); in Ecuador and Mexico, programs adapted over time to allow community-driven implementation to address issues with enrolment (Ecuador) and participant demands (Mexico; Joslin, 2019; Shapiro-Garza, 2013).

Case literature demonstrates that power relations shape whose values are affirmed in payments for ecosystem services design and implementation, and what kinds of knowledge are used to define environmental problems and solutions. The power of funders in framing environmental problems and solutions was clear in a number of programs (Costa Rica, Nigeria, Mexico, Ecuador) (see Annex 2.1) (Joslin & Jepson, 2018; Lansing *et al.*, 2015; Muñoz-Piña *et al.*, 2008; Shapiro-Garza, 2020). In some national and donor-driven programs (Mexico, Costa Rica, Nigeria), international actors and development institutions gained influence through alliance with domestic industries or political actors, at times shifting domestic power relations (Lansing *et al.*, 2015; Shapiro-Garza, 2020). In both Nigeria and Costa Rica, payments for ecosystem services / reducing emissions from deforestation and forest degradation (REDD+) was initially embraced as a response to both public debt and environmental crises, with strong influence of development institutions and international non-governmental organizations (Lansing *et al.*, 2015). In Costa Rica, World Bank goals empowered the then-marginal forestry sector, helping the payments for ecosystem services law to win out over an alternative forestry law promoted by environmental and social movement actors (Fletcher & Breitling, 2012; Silva, 1997). Similarly, despite alternative drivers of páramo degradation in Ecuador such as development projects and water diversion, rural livelihood practices became the focus of Quito's water fund program based on input from local and international non-governmental organizations and the water utility, with limited involvement of affected communities (Joslin, 2020). These cases suggest the need for further attention to the equity implications of how payments for ecosystem services are imposed as a solution, especially where international ecosystem services markets are sought out to address fiscal issues.

4.5.3.5 Conclusions

Findings indicate that misalignment between payments for ecosystem services and local values, knowledge, and institutions are likely to negatively affect social and environmental outcomes, and that these effects can impact program longevity and effectiveness. In case studies, integration of community values and participatory decision-making power early on strengthened social outcomes, rather than tacking on social goals as co-benefits. Local participation in payments for ecosystem services was most effective where well-organized community institutions were engaged in program design and administration, and where land rights were recognized, including communal ownership. Nevertheless, even cases that modestly improved distributional and procedural justice over time showed better outcomes relative to cases that did not make those changes.

The evidence illustrates that valuation and expression of values is a political process that will not be resolved by technical solutions or methods alone (Hausknost *et al.*, 2017; Muradian & Rival, 2012). Power relations built into program governance influence whether participant engagement is substantive or is simply used to gain consent. Further, structural factors affecting market values for ecosystem services and reliability of funding (especially in reducing emissions from deforestation and forest degradation (REDD+) and carbon markets) pose significant constraints to benefit sharing and impose market risk on participants. Gaps still remain in the understanding of payments for ecosystem services outcomes and the potential for payments for ecosystem services to support larger-scale transformation of socio-ecological systems towards sustainability and justice; see section 4.7 for more details.

4.5.4 Sustainability certification programmes

4.5.4.1 Outcomes

We split our review on outcomes of sustainability certification programmes[17] into different categories related to the IPBES conceptual framework: nature and nature's contributions to people, good quality of life, and institutions.

Nature and nature's contributions to people

Nature's contributions to people (specifically for climate regulation) and biodiversity (specifically for bird diversity and tree diversity), maintained at certified plots are somewhat higher than those of the business-as-usual production systems, particularly for the case of oil palm, cacao, and coffee (Gockowski *et al.*, 2013; Schmidt & De Rosa, 2020). The environmental outcomes, which put more emphasis on non-anthropocentric approaches to environmental ethics, cover outcomes towards a more heterogeneous landscape (Azhar *et al.*, 2015) and better care for nature (Ingram *et al.*, 2014). However, there were insignificant impacts on deforestation, fire incidents (Carlson *et al.*, 2018; Morgans *et al.*, 2018), and orangutan presence (Morgans *et al.*, 2018).

Sustainability certification programs at a scale that may contribute significantly to the increase of nature's contributions to people are limited. A study in Ghana even concluded that the 228,000 ha of additional forest land required to produce one million tons with Rainforest Alliance (RA-Cocoa) raises questions about which system would impact environmental services the least (Gockowski *et al.*, 2013). In the case of soybean (Tomei *et al.*, 2010), when the certified product is processed to biofuel, the aggregate environmental outcomes of this additional demand are still detrimental.

Good quality of life

Much of the literature has focused on (lack of) economic benefits farmers perceive from participating in these schemes. It is difficult to disentangle the effects of certification on farmers' economy and working conditions, from the effects of the training program and other development initiatives which are implemented to accompany farmers in adopting sustainable practices in general (KPMG SUSTAINEO, 2013). Certification appears to be concentrated in areas important for biodiversity conservation, but not in those areas most in need of poverty alleviation, although there were exceptions to each of these patterns (Tayleur *et al.*, 2018).

Agricultural productivity and infrastructure. Most independent smallholders in the case of roundtable for sustainable palm oil (RSPO) certification gain higher productivity as a benefit of certification (Morgans *et al.*, 2018). However, not all these economic benefits are currently present in the context of the smallholder certification pilot projects (Brandi *et al.*, 2013). Improvements in yield have been documented, but mostly at the estate or concession rather than at the smallholder levels (Morgans *et al.*, 2018). In coffee, increases in physical capital are attributable to local industry infrastructure under the Fairtrade certification offering a strategic return on investment to farmers. However, the ability of certification schemes to facilitate larger investments in public infrastructure is limited, and a more realistic assessment of this impact pathway is necessary.

Economic benefit. Economic benefits are the most contested in the literature, and less likely a result of marginal price premiums than of indirect factors, such as improved yields, increased resilience, and enhanced access to credit (Bray & Neilson, 2017; see also 4.3.3). Certification is associated with increased levels of farm-level record-keeping, which may, in time, result in heightened levels of financial literacy and improved farming efficiency as farmers become more aware of the impacts on profitability of undertaking certain practices. Improved market access at the firm-level is a consistent finding in both under forest stewardship council (FSC) (Quevedo, 2007) and Rainforest Alliance (RA) certification (Markopoulos, 1998), securing new export markets and price premiums for several lesser-known timber species. However, in most of the cases, higher prices for timber have not translated into significantly higher community incomes (Markopoulos, 1998). Similar results were documented under Fairtrade, where value added stopped at the organizational level and moved down to farmers with uneven distributions (Parrish *et al.*, 2005). The analysis of the marine stewardship council (MSC) label shows that small-scale fisheries, particularly in developing countries, have been somehow excluded in getting economic benefits from certifications (Ponte, 2008).

Health, safety and workers' rights. Sustainable Agriculture Certification (SAN) generated positive outcomes in relation to training and qualification, proper use of individual protection and equipment (Barbosa de Lima *et al.*, 2009), improved health and safety and better working conditions, community and workers' rights (Quevedo, 2007), though it is difficult to attribute these outcomes directly to certification (Brandi *et al.*, 2013). The global forest stewardship council case studies clearly reveal some consistency across regions and countries in these social effects, which include improved pay and conditions for workers, the development of community infrastructure.

Institutions and social capital

Social capital is frequently enhanced in terms of the strengthening of producer organizations as a direct result of

17. Literature review on outcomes in environmental certification (https://doi.org/10.5281/zenodo.4394498).

certification, and it is assumed that this generates various benefits for individual members. Fairtrade made a significant impact on social capital by increasing connectedness to both the global coffee industry and the domestic market actors, such as banks and domestic buyers along with some gradual impact on the organization's accountability, transparency and information flow mechanisms (Parrish *et al.*, 2005). Agronomic knowledge, farm management, and good agricultural practices were frequently improved in SAN certification through the provision of training associated with certification (Barbosa de Lima *et al.*, 2009). In general, a positive correlation between certification and education has some support in the literature, but causation is difficult to establish. In the case of forest stewardship council, the contribution of certification can be seen in improved compliance with governmental regulations (Hartsfield & Ostermeier, 2003) and better coordination, particularly on setting up the demarcation and management of protection areas (Markopoulos, 1998), relationships between timber companies and local communities (Quevedo, 2007), and the provision of training.

Participation in the case of Rainforest Alliance UTZ certification schemes may have unexpected outcomes on the role of women in cocoa marketing, as men seem to be assuming a greater role in cocoa marketing through the new farmer organization structures associated with certification (Hafid *et al.*, 2013). The tendency for certification to be adopted by relatively better-resourced households within a community, who also assume leadership positions within organizations, suggests a link to rising inequality that may have both gendered and structural (in relation to labour) dimensions (Bray & Neilson, 2017). Debilitating weaknesses in social and institutional relations were identified by the certification process, thus certification has refocused attention on the community as the basic socio-political unit of forest management (Markopoulos, 1998).

4.5.4.2 Values

Financial values in certification are manifested in guaranteed premium prices, positive incentives for nature's contributions to people and reduced costs of certification. Premium pricing (as long as these are paid and reach them) motivates smallholders for joining certification (Brandi *et al.*, 2013; Hutabarat *et al.*, 2018; Saadun *et al.*, 2018). A study on marine sustainability certification stated that such initiatives will keep putting 'sustainability' at the service of commercial interests until premiums are paid at the producer level (Ponte, 2012). However, workers' wages do not seem to benefit from the presence of certification and further along the causal chain; no evidence was found that total household income improves with certification (Oya *et al.*, 2018). The value chain structures through which certification programmes are implemented are highly varied and strongly influence livelihood outcomes.

Smallholders, particularly independent farmers (Brandi *et al.*, 2013; Oosterveer *et al.*, 2014) and small-scale fisheries (Stratoudakis *et al.*, 2016), usually lack the financial means to shoulder certification costs without financial support. Investment in developing market opportunities, infrastructures and institutional capacities in accessing financing schemes can help mobilise the support for these smallholders and fisheries (Stratoudakis *et al.*, 2016). Independent microcredit is an alternative as more farmers require capital from outside the banking sector. Further, one approach being tested by the Forest Stewardship Council and its accredited certifiers is a lower-cost, more streamlined assessment procedure for low-risk operations, evaluation requirement, and efforts to promote group certification (Quevedo, 2007).

Intrinsic values for nature are apparent in the environmental goals of the certification programs themselves. Scale and patterns of land-use change influence the effectiveness in supplying nature's contributions to people and producing landscape-level outcomes. Certification still struggles to effectively combat large-scale environmental problems, but can effectively contribute towards reducing negative environmental outcomes on a rather small scale (Bray & Neilson, 2017). This is due to a lack of broad market uptake that limits the effectiveness of voluntarily certified commodities and regulatory loopholes in the systems halting the contributions of countries with comparatively strong market uptake (van der Ven *et al.*, 2018).

The case of Dolphin Safe found that certification narrowly focused and measured on specific (marine) species that may be of much more interest to consumers (Ward, 2008). Thus, the enabling condition recommended ways to reduce the problem of consumer apathy on sustainable marine fisheries as a big picture, and not only care for specific marine species. From the perspective of an intermediary, certifiers should focus their efforts on key leverage points along supply chains where changes made can have meaningful conservation outcomes (Cohn & O'Rourke, 2011).

When the certification initiative is in an isolated management unit, i.e., specific concessions or plantations, achieving positive outcomes for nature's contributions to people often requires linking existing certification mechanisms with broader landscape management approaches or expanding current certification models to consider the landscape itself as the certified unit (Tscharntke *et al.*, 2015). Positive incentives such as a price premium linked to conservation, and greater collaboration with local governments and non-governmental organizations for forest protection, may indirectly increase forest area preservation (Carlson *et al.*, 2018) and sustainable fish management (Ponte, 2012) after certain landscape / seascape intervention scale is reached due to the conservation interventions under the sustainability certifications.

4.5.4.3 Knowledge

The case of roundtable for sustainable palm oil in Kalimantan highlighted the importance of baseline information in measuring environmental outcomes: orangutan populations declined in both certified and non-certified concessions between 2009–2014, and the rate of decline was even faster in certified concessions (Morgans *et al.*, 2018). As the roundtable for sustainable palm oil regulations prohibit new plantations from replacing primary forest from November 2005, forested land and viable orangutan habitat would likely have been cleared in the years prior to certification for current and potential future plantation establishment. Conversely, as no clearing regulations exist for non-certified plantations, many still contain forest patches and viable habitat, particularly concessions that have been gazetted but are at present inactive (Meijaard *et al.*, 2017).

In addition to scientific knowledge, understanding the socio-ecological background and inherent nature of smallholders (which links to their local knowledge) is critical to designing a holistic certification scheme that does not neglect the plight of smallholders in the socioeconomic outcomes (Saadun *et al.*, 2018). Producers' knowledge and capability to implement the certification process determine the level of their controls and power-relations with the certifiers (Melo & Wolf, 2007). Conversely, higher farmer knowledge on the certification programme can result in better implementation of good agricultural practices and better outcomes (Ingram *et al.*, 2014; Quevedo, 2007). More active and transparent information dissemination is needed to overcome this information gap (and reduce future costs) (Ayalew, 2014; Brandi *et al.*, 2013).

4.5.4.4 Decision-making processes, power relations and institutions

Stronger pre-existing institutions within the producer community are more likely to result in socioeconomic benefits for individual households (Bray & Neilson, 2017; Ton *et al.*, 2007). Networking and partnership of smallholders with other stakeholders, such as private sectors, traders, and non-governmental organizations partners are deemed important to ensure the flows of social (such as facilitating the formation of producer groups) and financial (such as pre-financing the investments) benefits from participation in certification (Hidayat *et al.*, 2015; KPMG SUSTAINEO, 2013). The case of the roundtable for sustainable palm oil certified growers suggested that a much closer cooperation between governments and the palm oil roundtable, in addition to the engagement of the palm oil roundtable members with those independent producers and local communities, could catalyse positive sustainability outcomes on the ground (Moreno-Peñaranda *et al.*, 2015).

4.5.5 Large infrastructure projects

4.5.5.1 Outcomes

Major environmentally disruptive and irreversible projects, such as large dams and mines, pose a special challenge to decision-making, distinct from the other themes in this section. They dramatically transform ecosystems and displace people or affect livelihoods in order to provide irrigation, hydropower, or minerals—all sources of human material well-being. Trade-offs between the (largely) instrumental values of these (abiotic) natural resources and the instrumental, intrinsic and relational values that (biotic) nature provided earlier are therefore inevitable. In this context, "better decisions and outcomes" could mean different things: better resettlement or compensation for affected communities, more mitigation of post-project environmental impacts, scaling down of the project to reduce adverse impacts, or even the rejection of some projects in extreme cases.

In terms of immediate well-being, the abiotic resources mobilized through dams and mines provide substantial material well-being (Fields *et al.*, 2009). Even after compensating for negative material impacts, aggregate material well-being may in most cases be positive (depending upon the measure and method of aggregation used). But the concept of compensation cannot be applied to intrinsic values. Moreover, aggregate measures of well-being may hide major distributional differences. Finally, most reviews suggest that projected material benefits, especially from dam projects, are often not realized fully in practice (World Commission on Dams, 2000).

On the sustainability dimension, mines are by definition 'unsustainable' as the mineral resource is non-renewable; sustainability then only has meaning if defined as 'weak sustainability', wherein financial capital substitutes for natural capital (Ayres *et al.*, 1998; Hilson & Basu, 2003), but there is much debate about this approach (Kirsch, 2010; Shang *et al.*, 2019). Hydropower dams, on the other hand, are seen as enhancing overall sustainability because they produce renewable energy or are carbon-neutral (Berga *et al.*, 2006). In reality, dams have a finite life of 50-100 years because of siltation (and often less: Cooper *et al.*, 2018), may not be zero-emission (Fearnside, 2016), and dam-based irrigation often leads to water logging and salinity (D'Souza *et al.*, 1998; Scudder, 2005; World Commission on Dams, 2000). Finally, compensatory efforts notwithstanding, such projects inevitably lead to a decline in the intrinsic value components of nature (McAllister *et al.*, 2001; Murguía *et al.*, 2016; Winemiller *et al.*, 2016).

In terms of justice, the benefits typically accrue to sections of society (urban, industrial or downstream farmers) that are quite distinct from those that bear the costs (rural, agrarian

or forest-dwelling, upland farmers). The costs include displacement, health hazards, loss of livelihoods and cultural values, etc. Rehabilitation/compensation efforts have often been inadequate (Hendryx, 2015; Singh, 1990; World Commission on Dams, 2000). Moreover, large dams and mines are most often located in regions that are inhabited by indigenous people or other marginalized communities, sharpening the social injustice involved (Cariño & Colchester, 2010; Özkaynak *et al.*, 2012; Özkaynak & Rodriguez-Labajos, 2017). Individual mines have smaller impacts than individual large dams, but the picture in regions with a high concentration of mines is dismal (Singh *et al.*, 2020). The windfall profits from mining versus its socio-environmental impacts present a particularly cruel paradox (Ali & Behrendt, 2001; Auty & Warhurst, 1993). Some attempts at better sharing of benefits in Canada & Australia (St-Laurent & Le Billon, 2015) and the district mineral funds established in India (CSE, 2017) notwithstanding, the distributional outcomes remain enormously lopsided.

4.5.5.2 Values

There is no simple distinction between the values articulated in favour of large infrastructure projects and those articulated in calls for their modification or rejection. Case studies from around the world **(Figure 4.10)** reveal that values for human life, material livelihood and human well-being dominate the discourse on both sides.[18] Dams and mines are proposed for their instrumental values: electricity to urban consumers or irrigation water to farmers, and jobs. Those negatively affected also primarily highlight material impacts on their lives, health and livelihoods: loss of agricultural and forest-based livelihoods and displacement (the Sardar Sarovar dam in India, the Ilisu dam in Türkiye, North Karanpura coal mine in India), fishing (the Hidrosogamoso dam in Colombia), livestock rearing (Ilisu dam), or health threats (North Karanpura coal). But whenever decision-makers value aggregate material well-being, whether through the use of benefit-cost analysis or contributions to gross domestic product, the objections get overruled. When additional values such as energy security, revenue generation, nation-building, or promoting industrialization are invoked they almost always prevail (Özkaynak *et al.*, 2012).

Relational values are largely expressed by local communities: highlighting ties with the forest, farm, river or fishery that is to be modified / destroyed (Urkidi, 2010). Moreover, relational values are not limited to ecosystems—the Ilisu dam opponents highlighted the value of the historical town of Hasankeyf. The intrinsic value of nature, such as in the "rights of the river" discourse, are not very visible in the debates; the "intrinsic value of human life and livelihood" (i.e., human rights) are more commonly cited.

The major concern articulated by the negatively affected groups is "intra-generational distributive justice" (Özkaynak *et al.*, 2012), a major drawback in all projects. Moreover, the simple aggregation of economic benefits and costs inevitably devalues the costs because they are faced by poorer communities (Hwang, 2016). Project-affected groups have also raised the two other dimensions of justice- recognition and procedural justice (Conde, 2017). They use different articulations: human rights, democratic rights, due process, "social justice" (including the rights of indigenous peoples or ethnic minorities). In most cases, however, the concept of "eminent domain" of the state and the larger "public interest" overrides such considerations. But when the judiciary supported the demand for procedural justice (Niyamgiri Bauxite Mine in India), the project ended up getting rejected.

Sustainability is invoked by opponents to hydropower dams in all cases, citing the destruction of biotic nature (forests, riverine ecosystems, agriculture), although in the case of dams, water as a renewable resource becomes the counter-argument. Pointing to the unsustainability of mining has had some impact on decisions, but terms such as 'sustainable mining' have been coined to counter these criticisms (Kirsch, 2010). Invoking other instrumental or intrinsic values of nature (e.g., climate regulation or biodiversity values of the forest lost to dams/mining) have had limited impact in decision-making on most projects, especially in the Global South.

4.5.5.3 Knowledge

There is a limited literature on the mobilisation of knowledge and its impact on decision-making in big infrastructure projects. From the case studies, it appears that both project proponents and opponents mobilized modern scientific knowledge to support their arguments. environmental impact assessments (EIAs) (or pre-EIA impact assessments) were used by project proponents but contested by others, cost-benefit analyses were challenged (Sardar Sarovar dam), social impact assessments and pollution studies were demanded (Hidrosogamoso dam, North Karanpura coal) and biodiversity inventories carried out (Ilisu dam). Affected communities articulated their traditional local knowledge (Hidrosogamoso dam) but sought also to integrate it with modern science (e.g., Hidrosogamoso dam opponents demanding an ecological study on water quality and fish decline). Alternatives or modified designs were proposed in several cases (Sardar Sarovar dam, Ilisu dam, Hidrosogamoso dam). Opposition to mining in Latin America has also looked for alternative development strategies (Avci *et al.*, 2010; Bebbington *et al.*, 2008), but typically lacked the resources to flesh out the alternatives, and therefore have had limited impacts on decision-making.

18. Review on outcomes in big development projects (mining and dams) (https://doi.org/10.5281/zenodo.4395985).

4.5.5.4 Decision-making processes, power relations, and institutions

Public decision-making regarding environmentally disruptive infrastructure projects has, for several decades, required some form of environmental impact analysis / assessment / appraisal (Morgan, 2012) paired with public consultation or hearings in most countries (Naber, 2012). However, there is a big gap between theory and practice, whether in terms of the technical rigour of the assessment or procedural democracy in the consultations (see Annex 4.3).

Hence, the World Commission on Dams (WCD) sought to extend the norms for environmental appraisal and public participation by outlining a set of principles for a good decision-making process (Dubash, 2010; Moore *et al.*, 2010). Key among these is recognition of rights of affected communities, inclusion of stakeholders in decision-making, free-prior-informed-consent from indigenous communities, and transparent processes. The extractive industries transparency initiative (EITI) has also adopted some of these principles for mining (Rustad *et al.*, 2017). However, the case studies indicate that these principles are rarely followed. In all cases, the "in-principle" decisions to go ahead with the projects preceded socio-environmental appraisals by years or decades. Public hearings were either not carried out because they were not legally required at that time (Sardar Sarovar dam, Ilisu dam), were carried out after construction had commenced (Hidrosogamoso dam), or were carried out perfunctorily (Niyamgiri bauxite, North Karanpura coal). Decisions to proceed were endorsed by expert committees and finalised at the political level without any wider consultations. In that sense, procedural justice was repeatedly violated, just as a utilitarian focus on aggregate benefits violated distributional justice.

Alternative forums or processes have been invoked in all cases, and were effective to some extent in a subset of cases. The first step is typically to explore the formal mechanisms involved, such as demands to hold statutory environmental impact analysis/assessment/appraisal that were skipped (Ilisu dam), public hearings that were missing (Hidrosogamoso dam), or to conduct fresh studies (North Karanpura coal). These approaches yielded some modifications or mitigation measures (Ilisu dam) but did not go beyond that. The wider literature supports these conclusions (Annex 4.3) that formal appraisal and consultative processes largely result in only minor mitigative measures. The Klamath river basin programme on decommissioning of dams perhaps represents one of the few multi-stakeholder efforts that were successful to an extent (Maven, 2020; Schlosser, 2011) **(Box 2.10)**.

A somewhat more effective alternative strategy to get voices heard was mobilising public opinion and building cross-national networks to put pressure on project funders. In two cases (Ilisu dam and Sardar Sarovar dam), funders withdrew from the project. But this method of value articulation appears to be less effective in mining projects, which are less capital intensive. Moreover, even when funders withdrew, the national governments went ahead with dam projects using their own funds (Ilusu and Sardar Sarovar).

Another process that has been explored and appears to provide space for broader value articulation is the judiciary. Where the judiciary has interpreted the right to life to include rights to be safe from environmental harm, or have upheld the need for due process in general and the rights of indigenous communities have a say in (Corte Constitucional de Colombia, 2013) or veto (Niyamgiri mining) projects affecting them, the eventual decision-making process has been more rigorous and democratic than the original one. However, the judiciary has focused on recognition and procedural justice, rather than on valuing particular concerns such as "sacredness", "intrinsic value of nature", "rights of nature" etc. even when such values have been invoked by certain stakeholders. Still, the role of the judiciary thus appears to be key (Faure & Raja, 2010; Sahu, 2016), although accessing judicial remedy remains a challenge even with green courts due to delays in hearings, appeals that prevent final decisions, among other barriers (Dilay *et al.*, 2019).

Finally, the option of street protest has been pursued in most cases. In Sardar Sarovar dam, the anti-dam movement conducted mass actions at various scales for over two decades and, combined with litigation, led to better rehabilitation. In some mining conflicts, the innovation has been to call for local referendums on the issue (Özkaynak & Rodriguez-Labajos, 2017; Urkidi & Walter, 2011). Unfortunately, states have usually responded to protests with repressive measures: refusing permission for protest marches, counter-propaganda, and arrests.

4.5.5.5 Conclusions

The evidence indicates that much more needs to be done to improve the decision-making process around environmentally disruptive infrastructure projects, including both the quality of socio-environmental appraisals as well as the quality of decision-making procedures and the recognition of rights of affected communities (UNEP, 2019). But this is unlikely to happen unless the extreme power imbalance between growth-focused governments and profit-focused corporations on the one hand and adversely affected communities on the other is redressed (Morrice & Colagiuri, 2013). Social movements have sought to shift this imbalance through various means: building networks, deploying discursive strategies (Özkaynak *et al.*, 2015), litigation and street protest. But this is likely to be insufficient unless there is a larger shift away from the utilitarianism of aggregate benefits, and towards value for equity, social justice and democratic process in decision-making (Jha-Thakur *et al.*, 2009; Menon & Kohli, 2019).

4.6 UPTAKE OF VALUATION OF NATURE TO SUPPORT DECISION

4.6.1 Introduction

This section reviews evidence that valuation methods – as described in Chapter 3[19] – are being used by stakeholders for different purposes in the policy cycle. Section 4.6.2 reviews literature on barriers to and criteria for uptake by stakeholders and proposes a framework for assessing both literature blindspots on uptake, as well as identification of valuation best practice[20]. A systematic review of published research valuing nature's contributions to people in section 4.6.3 finds continuing research blindspots regarding documentation of stakeholder uptake[21]. Section 4.6.4 reports on the coincidence between the amount of peer reviewed valuation research at country level, national implementation of natural capital accounting and national reporting on valuation uptake to the CBD[22]. This section also looks more closely at how valuation is implemented at different scales, including United Nations standardisation of System of Environmental Economic Accounting-Ecosystem Accounting (SEEA EA), in European Union policy and at national level with the example of the United Kingdom. The potential for uptake of local and indigenous valuation knowledge in legal designations of rights and policy plans is reviewed and exemplified in section 4.6.5. Finally, section 4.6.6 contains seven case study "brightspots" – examples of how barriers to valuation uptake can be overcome for a range of methods addressing stakeholder needs at different governance scales and policy cycle stages.

4.6.2 Policy cycle and valuation uptake

4.6.2.1 Policy cycle

The development of public policy over time can be described as a policy cycle (IPBES, 2016b, 2016c; Jann & Wegrich, 2007). The ways local stakeholders may provide their knowledge and represent their values related to nature at different stages is complex and much discussed (for example Barton *et al.*, 2018; Chan & Satterfield, 2020; Dick *et al.*, 2017; Fisher *et al.*, 2008; Grêt-Regamey *et al.*, 2017; Harrison *et al.*, 2018; Jacobs *et al.*, 2018; Kenter *et al.*, 2016; Laurans *et al.*, 2013; Mandle *et al.*, 2020; Marre *et al.*, 2016; Marre & Billé, 2019; Martinez-Harms *et al.*, 2015; Posner *et al.*, 2016; Primmer *et al.*, 2015; Rosenthal *et al.*, 2015; Ruckelshaus *et al.*, 2015; Saarikoski *et al.*, 2018; TEEB, 2010; Vatn, 2009). Here uptake in the policy cycle of stakeholder values is represented by the proxy of valuation methods. Valuation uptake reviews identify the extent to which valuation literature documents actual use of valuation results (see 4.6.3). Much of the above research on valuation uptake highlights that the purpose and design of valuation must fit knowledge demands of stakeholders specific to the context and stage of the policy cycle **(Figure 4.11)**. The timing of valuation to coincide with entry points in the policy cycle presents opportunities for increasing valuation uptake. At different entry points in the policy cycle valuation should be designed to meet specific purposes (Laurans *et al.*, 2013) **(Figure 4.11)**.

Valuation can be used to inform agendas and support commitment to agreed goals (e.g., Bateman *et al.*, 2014; Kenter *et al.*, 2016). Valuation can provide technical support for policy formulation and design, for example helping to achieve agreement on the types of alternatives under consideration (e.g., Fish *et al.*, 2016; Marttunen & Hämäläinen, 2008) or determining voluntary incentives such as levels of payment for ecosystem services (e.g., Whittington & Pagiola, 2012; Yoshida, 2004). Valuation can be used for decisive purposes by supporting decisions for policy adoption (e.g., Clark & Turpie, 2014; Griffiths *et al.*, 2012) and helping reach agreements about the means of implementation. Valuation can support in-course adjustments to implementation measures, or justification for continued budget allocations (e.g., Bennett *et al.*, 2018). The use of valuation methods can also provide agreed means of retrospective policy evaluation – when applied in the context of impact evaluation (e.g., Ferraro *et al.*, 2012) or natural capital accounting (e.g., Ouyang *et al.*, 2020), valuation can also provide key ex-post information on the effectiveness of implementation and achievement of policy goals. Such ex-post applications of evaluation methods also serve the purpose of method development for researchers since they provide the opportunity to compare ex-ante and ex-post evaluation processes, and as such, the ability to test the effectiveness of the used methods (Boardman *et al.*, 1994). Completing the policy cycle, valuation can contribute to renewed agenda setting and the development of new policies or projects to address emerging sustainability issues.

The Economics of Ecosystems and Biodiversity (2010) (international) initiative called for economic valuation studies to identify, demonstrate and capture economic values of ecosystem services. The large increase in publication of ecosystem service valuation studies has raised expectations of increased valuation uptake (Chan & Satterfield, 2020; Laurans *et al.*, 2013; Mandle *et al.*, 2020). A large portion of this peer-reviewed valuation literature has a basic research or explorative purpose and cannot be expected

19. Valuation Atlas (https://doi.org/10.5281/zenodo.6468906).
20. Systematic review on valuation uptake (https://doi.org/10.5281/zenodo.4391335).
21. Systematic review on valuation uptake (https://doi.org/10.5281/zenodo.4391335).
22. Coincidence of Aichi target 2 reporting and valuation at country level (https://doi.org/10.5281/zenodo.6468917).

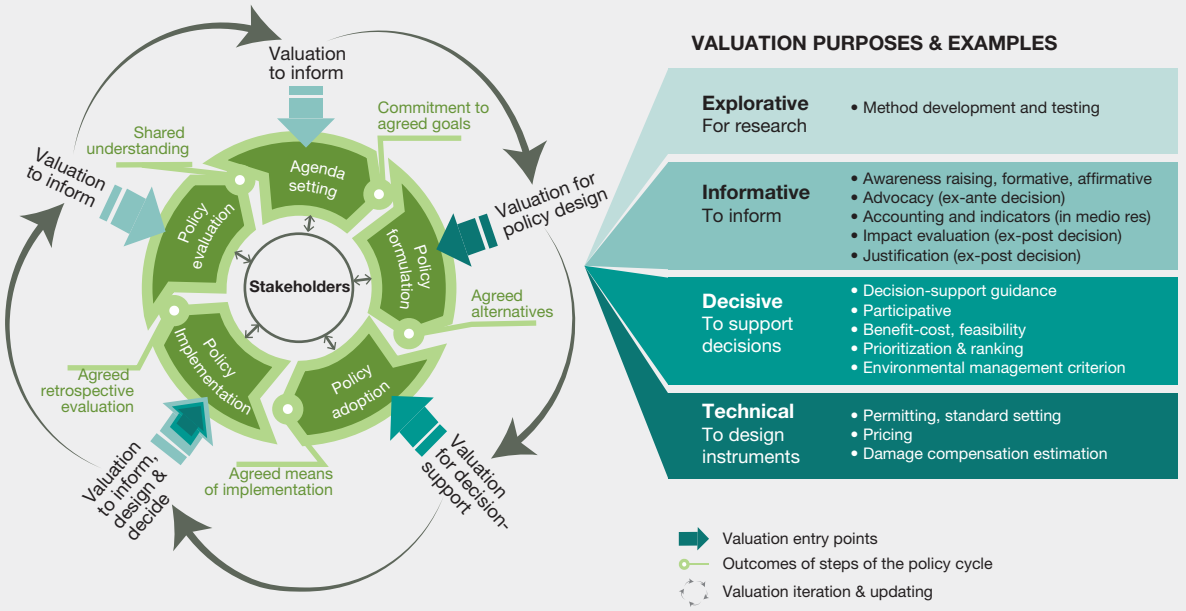

Figure 4 11 **Valuation purposes, entry points and iterations through the policy cycle (adapted from IPBES, 2016c).**

to document relevance for policy. Laurans *et al.* (2013) also point out that studies for informative purposes can have a decisive effect over time as they help reframe the policy debate. Valuation uptake over time is rarely documented. However, the exponential growth in valuation studies could be expected to reflect an observable increase in proportion of studies by valuation researchers documenting uptake. There are a number of potential barriers to uptake of valuation by stakeholders, which help explain why low uptake could be expected in the systematic reviews reported below.

4.6.2.2 Barriers to uptake

Recent systematic reviews of valuation studies published in the scientific literature point to gaps in the literature regarding use of valuation (and its outcomes) by stakeholders and impact on the ground (Chan & Satterfield, 2020; Laurans *et al.*, 2013; Lautenbach *et al.*, 2015; Mandle *et al.*, 2020). Laurans *et al.* (2013) and Lautenbach *et al.* (2015) document "blindspots" in uptake of ecosystem service valuation and assessment. Patenaude *et al.* (2019) call for evidence of impact of ecosystem service research. Robinne *et al.* (2019) compile a global tool and database (GlobaLDES) for the analysis of the ecosystem services concept in public policy, including case studies in languages other than English. Mandle *et al.* (2020) and Chan & Satterfield (2020) have conducted systematic reviews of hypotheses of lacking decision-relevance of ecosystem service assessment research. A science-policy-interface analysis study by Kieslich & Salles (2021) confirmed the persistence of an implementation gap and lack of measurable action in practice, identified in earlier reviews. In a national level example, Förster *et al.* (2019) used valuation experts to define a set of criteria by which they found only six of 109 valuation studies could be used in decision-making for German national policies.

Bagstad *et al.* (2013) defined useful ecosystem services assessment methods as quantifiable, replicable, credible, flexible, and affordable. Posner *et al.* (2016) assessed the importance of legitimacy, credibility, and salience for the policy impact of ecosystem service knowledge. **Table 4.3** associates explanations for blindspots in the use of ecosystem service valuation proposed by Laurans *et al.* (2013) to uptake criteria of (i) timeliness, (ii) salience, (iii) credibility, (iv) legitimacy, (v) process documentation and (vi) study cost. They are hypotheses. Based on systematic review findings above, studies with these characteristics are likely to be taken up and acted upon by stakeholders. Valuation uptake is defined as documented evidence of use by stakeholders. Documented uptake does not necessarily lead to nature conservation decisions, or even action – valuation may be commissioned and communicated, but ignored, or used to justify decisions to mitigate rather than protect (Singh *et al.*, 2020).

Characteristics that explain uptake can be found in studies referred to as 'brightspots' in section 4.6.6. Conversely, lacking uptake may be explained by the lack

Table 4 3 **Hypotheses for valuation blindspots – lacking documentation of valuation uptake.**

Valuation uptake criteria	Description	Hypotheses for lack of documented valuation uptake
Timeliness	Delivering quality information when and where it is needed to assist progress in the policy cycle	H1: Time-lags between initiation and completion of studies may imply that decision processes have moved on or shifted agendas
Salience	Addressing the options in the decision arena, including budgetary and legal consequences	H2.1: Lack of 'actionable' targets within existing institutional framing and mandates of decision-makers
		H2.2: Regulatory framework not conducive to use of certain types of valuation outputs
Credibility	Building on a shared understanding of how things work, conditions and trends and prospects of consequences, through transparent methods with explicit assumptions and documented uncertainty	H3.1: Lack of support for and use of a shared understanding of the underlying patterns and processes; unsupported assumptions; and / or non-transparent methods
		H3.2: Valuation outputs that are too uncertain relative to decision-support requirements (biophysical and monetary)
		H3.3: Decision-makers do not have sufficient training in valuation methods
		H3.4: Lack of standardization of valuation methods
Legitimacy	Representing the interests of all legitimate stakeholders through composition of the team and transparency of the process followed	H4.1: Lack of full representation of the perspectives of all legitimate stakeholders and impressions of serving vested interests
		H4.2: Valuation knowledge hampers political strategies that require a certain opacity or ambiguity
Process documentation	Independent assessment of the interface between valuation study stakeholders and users of the resulting products	H5: Lack of independent assessment of influence on decision-making at appropriate timescales
Cost	Cost of information is less than and proportional to benefits of the decision under consideration	H6: The cost of ecosystem service valuation restricts its use

of any of these characteristics in studies and these are 'blindspots'. Odds are skewed against valuation uptake because studies need to meet most / all uptake criteria, while failing any of the criteria is a sufficient condition for a study not to become available for, or used by, stakeholders. Annex 4.6 provides further evidence in the literature of each uptake criteria.

4.6.3 Evidence of valuation uptake in the scientific literature

4.6.3.1 Previous reviews on valuation uptake

Laurans *et al.* (2013) found that only 2% of valuation studies reviewed in the fields of environmental and ecological economics documented use of ecosystem service valuation be it for informative, decisive or technical purposes. More recently Mandle *et al.* (2020) and Chan & Satterfield (2020) conducted systematic reviews of hypotheses of lacking decision-relevance (see Annex 4.7). Neither of the more reviews address the specific finding by Laurans *et al.* (2013) that studies do not document uptake by stakeholders.

Actual uptake understood as all the knowledge from valuation studies used by stakeholders may be well documented in government and consultant reports. However, with the resources available to this assessment such grey literature could not be accessed and searched systematically across, or even within countries. For some methods published reviews of use as documented in government reports are available. For example, while reviews of actual impacts assessment reports are difficult and hence rare, there are several global and regional reviews of legislations on impact assessments (Acerbi *et al.*, 2014; ELAW, n.d.; Loayza, 2012; UNEP, 2018). Despite the increasing use of environmental impact assessment in different parts of the world, uptake and implementation of legal requirements are found to be slow mainly due to lacking access to data on impacts on ecosystem services (UNEP, 2018) (see also 4.5.5).

The uptake review in this section focuses on documented uptake of valuation in the peer-reviewed scientific literature. Here documented uptake in scientific literature is used as a proxy indicator, which when combined with a review of national level reporting on valuation in national biodiversity strategies and action plans (see 4.6.4), provides a relative indicator of valuation uptake across countries.

4.6.3.2 Method for valuation uptake review

A large systematic review of research literature in Web of Science on ecosystem services and nature's contributions to people was carried out. The aim was to evaluate the extent to which published research literature on valuation of ecosystem services and nature's contribution to people is documenting uptake by stakeholders for informative, decisive or technical policy design purposes. For the systematic review, publications were selected from a corpus of over 79,040 studies (1990-2020), that identified at least one method family keyword in their title or abstract. This left 44,652 studies upon which the stratified sampling was based. A random stratified sample across method families and time periods was conducted. Then, a manual screening was performed by study coordinators, who agreed to leave out studies that were not about ecosystem services/nature's contributions to people and valuation applications. The final sample of papers coded by 26 contributing author reviewers was N= 1,900 ecosystem services / nature's contributions to people valuation studies[23].

Categories of purposes include a number of sub-purposes which are compatible with Laurans *et al.*'s (2013) classification into informative, decisive and technical purposes as exemplified in **Figure 4.11**. A distinction is made between cases where uptake is only cursorily mentioned, and where it is actually documented in valuation studies. Additionally, valuation studies initiated by stakeholders were distinguished as an indicator of "actual uptake" from cases where stakeholders participate in valuation studies on the initiative of researchers, as an indicator of methodology oriented "testing uptake". A stratified random sample by time period and method family strata was conducted in order to assess trends in valuation uptake over time. The detailed screening protocol, validation procedures, classification definitions for uptake and purposes of valuation used by reviewers can be found in the corresponding data management report[24].

4.6.3.3 Summary of systematic review findings

Documented valuation uptake among studies valuing ecosystem services / nature's contributions to people was in a range of 3.6-15.7%. The range reflects classification uncertainty among *non-expert* reviewers revealed through validation. Subdividing uptake, "actual uptake" lies in the range of about 1%-4.3% for the period 1991-2020. "Research testing" uptake lies in the range of 2.5%-11.4%.

Presumably, classification uncertainty has not been quantified in previous reviews. Nevertheless, the upper estimates reflect proportions of policy relevant features also found in the Mandle *et al.* (2020) and Chan and Satterfield (2020) reviews. The lower bound estimate compares to Laurans et al's (2013) findings on documentation of actual use by stakeholders. Taken together the four reviews tell a coherent story of a small but growing minority of valuation studies that have policy relevant features, but an even smaller but stagnant proportion that document how they are taken up by stakeholders. Looking across multiple valuation methods, and 7 years after the Laurans *et al.* (2013) blindspot study, there are only weak indications of improvement in documentation of uptake.

23. Systematic review on valuation uptake (https://doi.org/10.5281/zenodo.4391335).

24. Systematic review on valuation uptake (https://doi.org/10.5281/zenodo.4391335).

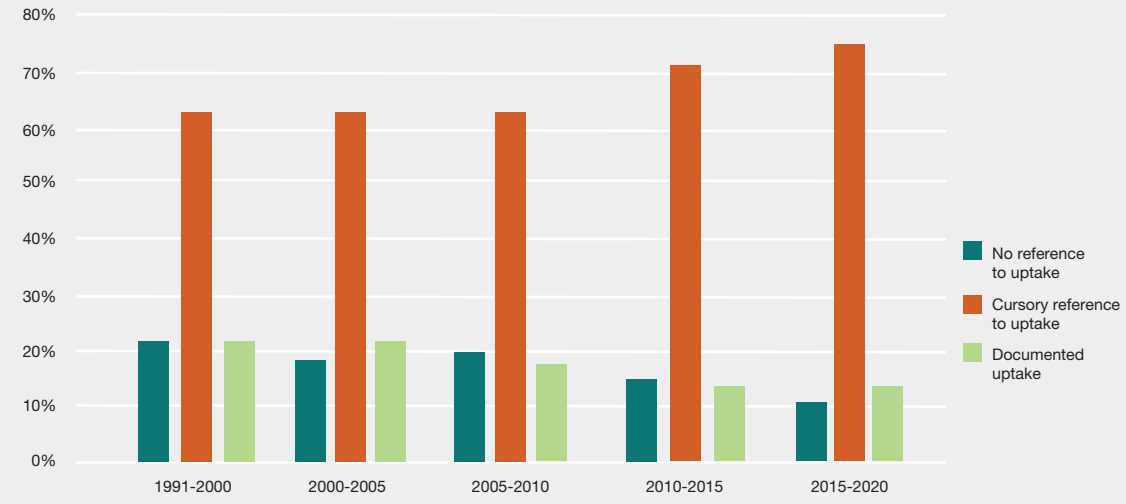

Figure 4 12 **Valuation uptake by time period.**

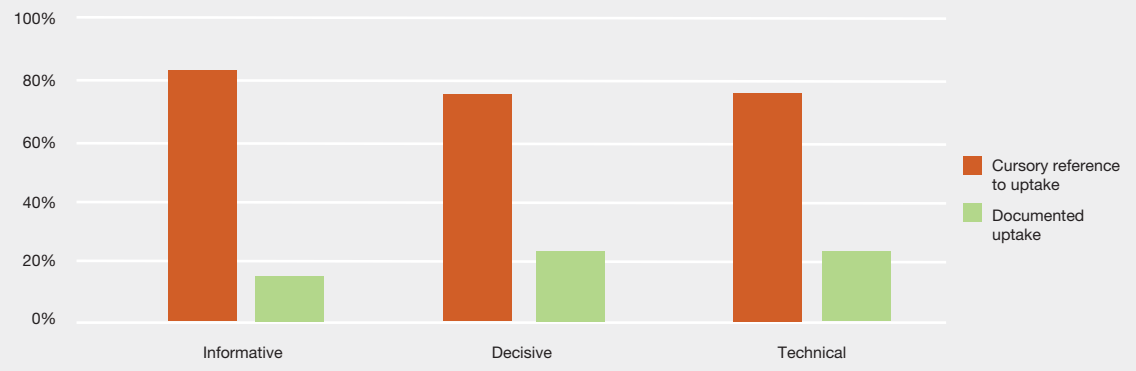

Figure 4 13 **Valuation uptake by purpose.**

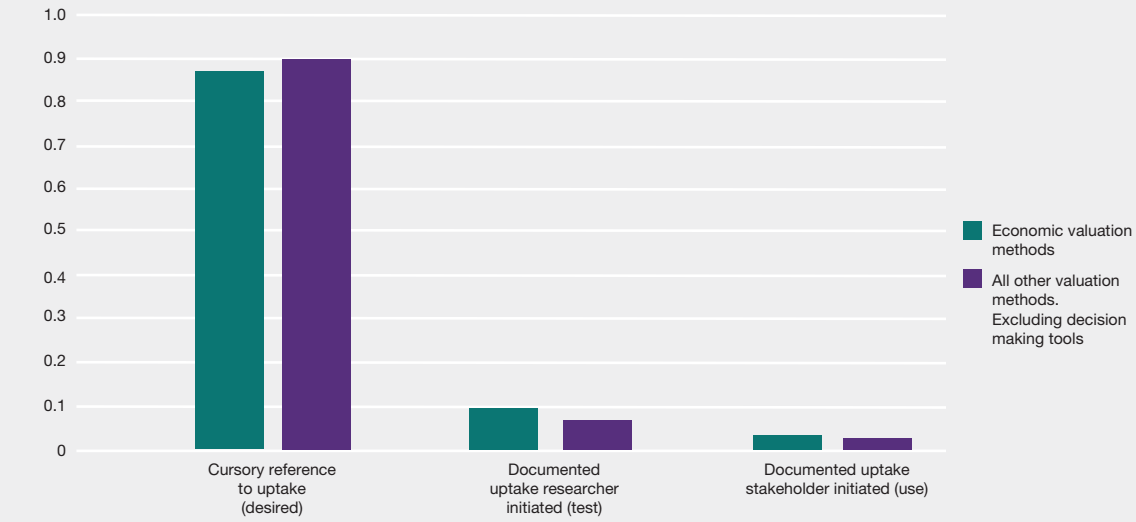

Figure 4 14 **Uptake of economic compared to other valuation methods.**

Figure 4.12 shows that the large majority of valuation studies provides only cursory reference to uptake by stakeholders. There is a small increase over the last two decades in the share of valuation studies making cursory reference to the purpose of valuation, but the share of studies with documented uptake has not increased in the period 1991-2020. Frequencies of documented uptake of 14-18% (15.7% over 1991-2020) represent uncorrected data. A validation exercise found a substantial proportion of possible "false negative" uptake studies in the coding. After correcting for false positives, documented uptake may be as low as 3.5% of the ecosystem services/nature's contributions to people valuation studies identified.

Further disaggregation of data showed 27.3% of "actual uptake" (stakeholder initiated), and 72.7% as "testing uptake" (researcher initiated). This distinction in type of uptake has not been made in previous systematic review studies of valuation. Applied to results in **Figure 4.13**, and extrapolating uncertainty found in the coding, "actual uptake" as a proportion of valuation studies, may lie in the range of about 1%-4.3% for the period 1991-2020. Similarly, research testing uptake would lie in the range of 2.5%-11.4% considering coding uncertainty.

Figure 4.13 reports on valuation uptake by purpose. The hypothesis was that documented uptake would increase for studies with decisive or technical policy design purposes. There is some tendency in the review data to support this. However, the difference is small. This might be an indication that documentation of uptake is researcher, rather than stakeholder driven. The systematic review was expected to form a basis for identifying best practice of valuation uptake. In particular, studies for decision support were expected to provide a number of "brightspots" (see 4.6.6). Although use cases were numerically and proportionally higher in

studies with decisive purposes, the number and proportion of papers depicting and analysing actual (and not potential) decisive use was modest.

Using the same literature corpus[25], but a sample for 2010-2020, Chapter 3 conducted a parallel systematic review with in-depth classification of valuation methods[26]. The comparison excluded decision-support tools (cost-effectiveness, cost-benefit analysis, and multi-criteria analysis) which often use mixed data, in order to have a more distinct comparison (N=1015) (Annex 4.7). Using this sample, the likelihood of economic valuation methods documenting uptake across a range of purposes was compared to that for other valuation methods **(Figure 4.14)**. Findings on documentation of uptake from this independent sample show similar patterns with cursory reference to uptake constituting four fifths of the sample. Unexpectedly, economic valuation methods are only slightly more likely than other methods to document uptake than other valuation methods (researcher supply side), while there is no difference for documented uptake of studies initiated by stakeholders (demand side). Despite initiatives like The Economics of Ecosystems and Biodiversity, researchers in economic valuation are only slightly more likely to "demonstrate and capture" economic values for stakeholders, than other valuation methods. Caveats to results and further discussion with respect to different valuation purposes are provided in Annex 4.7.

4.6.3.4 Conclusions

Despite the significant growth in valuation studies over the last 30 years, public documentation of the uptake of valuation practice to support public policy decisions at different scales remains low. Documented uptake of economic valuation methods is only marginally higher compared to other methods. Barriers to uptake of valuation in public decision-making may be partly due to perceived lack of robustness and reliability of some valuation methods. The lack of sufficient resources to commission valuation studies, administrative cost in integrating valuation into decisions, and insufficient technical capacity become additional barriers for policy uptake of valuation in public policy decisions. Other barriers include lack of alignment of valuation results with political jurisdictions, administrative levels or sector interests, lack of timeliness of results relative to decision windows, and lack of relevance of valuation results from the perspectives of stakeholders. In addition, key stakeholders may have the power to broker knowledge from valuation – as either a potential for, or barrier to, uptake in the policy issue cycle.

25. Valuation Atlas (https://doi.org/10.5281/zenodo.6468906).
26. Systematic PCIV (Principles, Criteria, Indicators, Verifiers) review on valuation methods (https://doi.org/10.5281/zenodo.4404678).

4.6.4 Valuation uptake at different scales

4.6.4.1 Coincidence of Aichi target 2 reporting and valuation at country level[27]

The valuation uptake literature review (see 4.6.3) is a representative sample of valuation knowledge available globally in public scientific journals. This subsection reviews whether a higher frequency of these ecosystem services / nature's contributions to people valuation studies in a country increases the likelihood of uptake of valuation by national government agencies. The analysis used two indicators to proxy the uptake of scientific valuation knowledge at national scale: (i) likelihood of ecosystem accounting implementation at national level indicated by the system of environmental economic accounting and ecosystem accounting, and (ii) likelihood of reporting Aichi target 2 progress in National Reports to the Convention on Biological Diversity (CBD) (Aichi target 2 *"By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems"*).

Figure 4.15 provides a visualization of the data and correlations at country level (Annex 4.8). Reporting on Aichi target #2 in National Reports to the CBD is incomplete in most countries (including categories unknown, not reported, moving away from target, some progress made **Figure 4.15**). Less than a quarter of countries reported meeting or exceeding the target (CBD, 2021). In a number of cases national governments' reporting did not reflect actual implementation of ecosystem accounting or valuation research that has been carried out in the country. Countries that reported meeting or exceeding Aichi #2 were likely not to have implemented the System of Environmental Economic Accounting-Central Framework (SEEA CF) or the System of Environmental Economic Accounting-Ecosystem Accounting (SEEA EA), and were likely to have limited to scarce national valuation research. About a third of countries implementing the System of Environmental Economic Accounting-Central Framework and ecosystem accounting were likely not to report on Aichi target #2. This indicates that as of 2020 a substantial share of national agencies compiling National Reports to the CBD were not familiar with the national statistical offices compilation of system of environmental economic accounting, and did not reflect the level of valuation of ecosystem services / nature's contributions to people in the country.

Nevertheless, a substantial proportion of countries did report on progress on valuation. The following subsections provide examples of how valuation is being taken up at different

27. Coincidence of Aichi target 2 reporting and valuation at country level (https://doi.org/10.5281/zenodo.6468917).

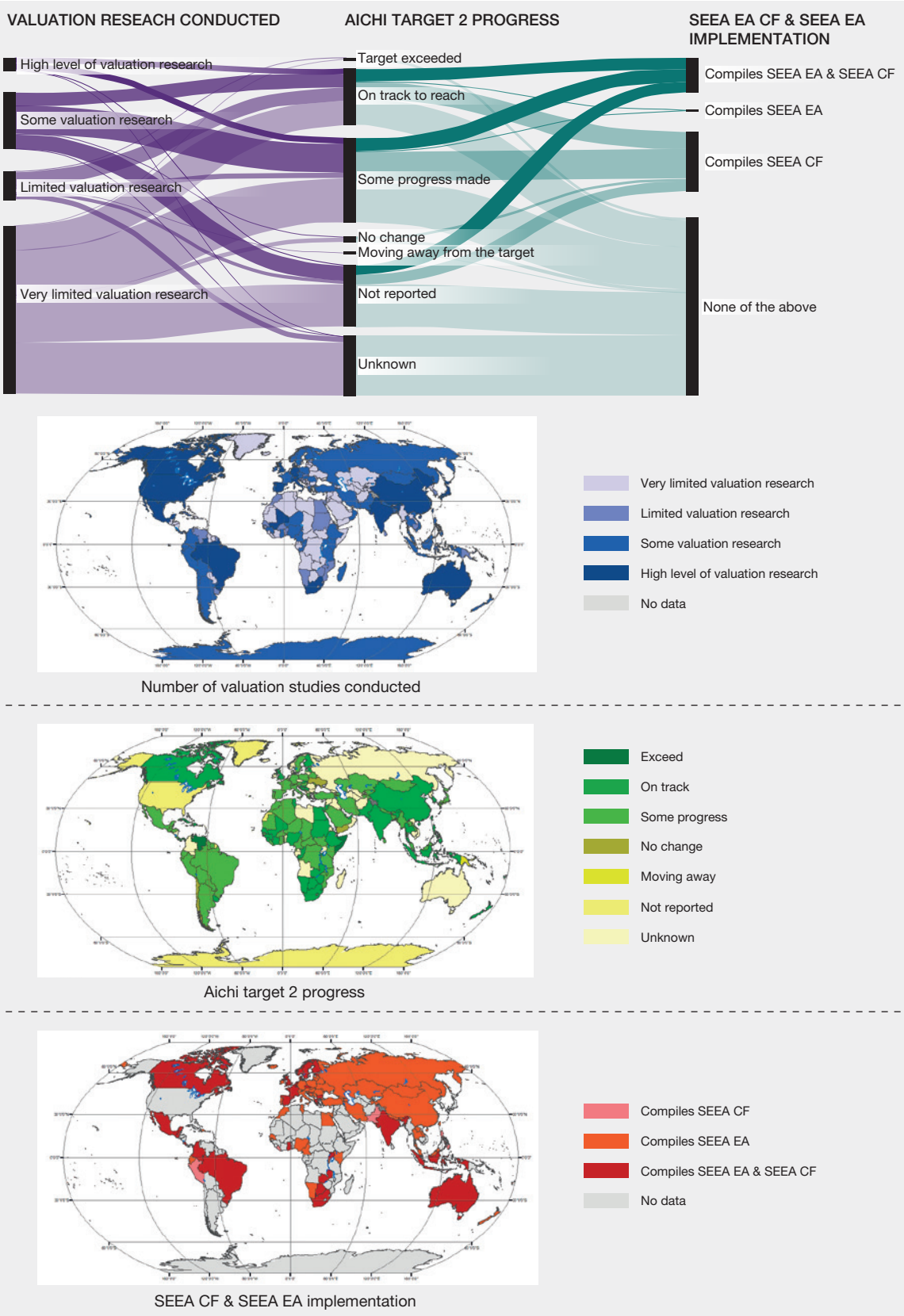

Figure 4 15 **Valuation research published, Aichi #2 target progress reported and implementation of the system of environmental and economic accounts as of September 2020 (central framework or ecosystem accounts).**

governance levels – through country implementation of United Nations system of environmental economic accounting (see 4.6.4.2); in European Union level policy (see 4.6.4.3) and in national policy documents in the United Kingdom (see 4.6.4.4); and in corporate disclosure of climate and nature risk (see **Box 4.7**).

4.6.4.2 Implementation of United Nations system of environmental economic accounting and uptake of public natural capital accounting in national policy

The system of environmental economic accounting organizes environmental and economic data in an integrated and conceptually coherent set of accounts to produce information to mainstream the environment into policymaking. Traditionally, the system of environmental economic accounting's main purpose has been to support macro-economic and sectoral decision-making, as well as reporting on the economy-environment nexus. The traditional macro-economic national accounts do not take the depletion or degradation of the environment into account, nor the various ecosystem services that society depends upon. Policymakers therefore don't have access to key information necessary to effectively pursue and track sustainable development. The system of environmental economic accounting has been developed to fill that gap, reporting on the environment-economy nexus in both physical and monetary terms. The spatial foundation of the more recent ecosystem accounting (SEEA EA) approach has the potential to inform (sub)national and local stakeholders and their decision-making needs, such as in land-use planning. The system of environmental economic accounting is also increasingly seen as providing a framework for organizing data to underpin global reporting such as on the Sustainable Development Goals and the Convention on Biological Diversity.

The number of countries implementing the system of environmental economic accounting is one of the indicators for Sustainable Development Goals Target 15.9. The target is: *"By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts". Sub-indicator (b) 15.9.1.b: Number of countries that have integrated biodiversity values into national accounting and reporting systems, defined as implementation of the system of environmental-economic accounting (SEEA)"* (UNSD, 2021). The number of countries undertaking natural capital accounting is increasing. As of June 2020, 89 (UN CEEA, 2021) countries had implemented the system of environmental economic accounting accounts, compared to 69 in 2017 (UN CEEA, 2018) and around 49 in 2006 when the first baseline was assessed (UN CEEA, 2007). The number of countries that had implemented system of environmental economic accounting-ecosystem accounting was 34 as of September 2020, with 13 additional countries that are currently experimenting (UN CEEA, 2020, 2021) (see **Figure 4.16**).

During the Global Consultation on the System of Environmental Economic Accounting-Ecosystem Accounting draft, a number of countries voiced concerns about including monetary valuation as part of the standard (UN CEEA, 2021). During subsequent discussions a compromise was found. In March 2021 the United Nations Statistical Commission (UNSC) agreed to remove the "experimental" from the title of the revised System of Environmental Economic Accounting-Ecosystem Accounting, adopting chapters 1-7 describing the accounting framework and the physical accounts as an international statistical

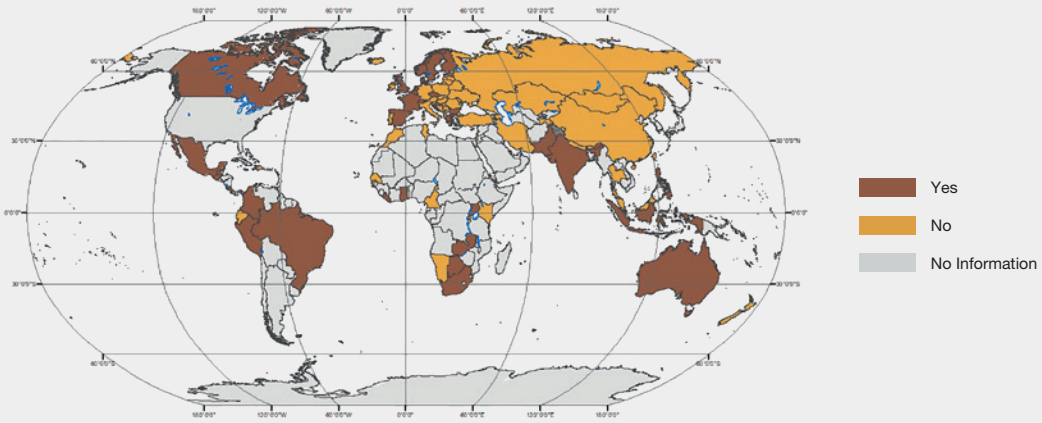

Figure 4 16 **Countries compiling system of environmental economic accounting-ecosystem accounting (adapted from UN CEEA, 2020).**

standard. The United Nations statistical commission also recognized that, chapters 8-11 of the system of environmental economic accounting-ecosystem accounting describe internationally recognized statistical principles and recommendations for the valuation of ecosystem services and assets (UNSD, 2021), and requested to promptly resolve the outstanding methodological aspects in chapters 8-11 as identified in the research agenda.

Early accounts compilation was often developed without involvement from the intended users of the accounts (Vardon *et al.*, 2019). They were often "supply driven" and to a lesser extent "demand/policy driven" (European Court of Auditors, 2019). The annual forum on natural capital accounting for better policy decisions held since 2016, which brings together policymakers and accounts compilers from around the globe, was established to address this need and has developed a range of principles for natural capital accounting and best-practices from countries (Vardon *et al.*, 2019). The supply driven nature of accounts development is changing. The ecosystem accounts follow a more participatory process including stakeholder consultation, in part because of its multidisciplinary nature which necessitates collaboration across various agencies. Recently, accounts have been used to provide support to macroeconomic policy, biodiversity policy, emissions tracking and climate policy, sectoral policy and spatial planning. Further documentation of national level application of natural capital accounting to policy can be found in Annex 4.9, Edens (2020) and on the United Nations System of Environmental Economic Accounting webpage (UN SEEA, 2021). The United Nations common agenda (United Nations, 2021) calls for *"new measures to complement gross domestic product (GDP)"* and urges *"Member States and others to already begin implementation of the recent system of environmental-economic accounting (SEEA) Ecosystem Accounting."*

4.6.4.3 Uptake of ecosystem service valuation in European Union policy

The EU coordinates economic and environmental policy across member states and as such represents a potential for supra-national impetus for valuation knowledge generation and influence on the uptake of valuation in national level policy assessment and design. The latest *State of Nature in the EU* report (European Environment Agency, 2020) *"underlines the need for a step-change in action if we are to have any serious chance of putting Europe's biodiversity on a path to recovery by 2030."* To date, although valuation evidence is increasingly used in communicating policy priorities, European Union policy has made little use of environmental valuation evidence. Some policies leave space for valuation, in particular the water framework directive (European Commission, 2020b), where environmental and resource costs and benefits can be used under article 4 (exemptions based on disproportionate costs) and article 9 (cost recovery of water services). The marine strategy framework directive calls for *"economic and social analysis of the use of those waters and of the cost of degradation of the marine environment"*, while the environmental liability directive allows valuation if resource equivalence methods are not feasible.

Greater use of valuation has been promoted in particular by the European Union biodiversity strategy for 2020 (European Parliament, 2012) which called for assessing values of ecosystem services and for integration of values in accounting and reporting. This promising avenue has led to a sustained research effort in ecosystem service assessment, valuation, and reporting, through the mapping and assessment of ecosystems and their services (MAES) (European Commission Joint Research Centre, 2020) and knowledge innovation project on integrated system for natural capital and ecosystem services accounting (KIP-INCA) (European Commission, 2016, 2020a) and supporting research projects. Although the mapping and assessment of ecosystems and their services (MAES) is the first European Union-wide ecosystem assessment (European Commission Joint Research Centre, 2020), it does not include any monetary estimates, it lays the foundations for ecosystem service quantification and valuation at the European scale. The new European Union biodiversity strategy (EUBS) 2030 section "measuring and integrating the value of nature" has no direct mention of monetary valuation, while accounting requires it. European Union progress (European Commission, 2020a) towards ecosystem accounting that is compatible with the recently adopted United Nations statistical framework for ecosystem accounting (SEEA EA) presented by Vysna *et al.* (2021).

Evidence suggests that the policy relevance of ecosystem service assessment and valuation could be enhanced. There has been some criticism of the practical impact and validity of applied cost-benefit analysis when it has been used by member states to assess policy targets of European Union Directives (Feuillette *et al.*, 2016). The European Court of Auditors (2019) found failings in the Commission's implementation of environmental accounting that reduced their usefulness for policymakers. Although the use of ecosystem services framing is now mainstream, valuation is still often mistrusted or misunderstood by policymakers (Tinch *et al.*, 2019). This reflects tensions between intrinsic and anthropocentric conservation motives, resistance to the concept of non-use values, and unfamiliarity with the tools and methods of valuation (Annex 4.10).

4.6.4.4 Uptake of ecosystem service assessment in national policy: An example from the United Kingdom

The United Kingdom national ecosystem assessment (UK NEA, 2011) demonstrated that failing to account for

Box 4 7 Uptake of nature-related financial disclosure in corporate accounting.

Efforts to identify the financial materiality of nature risk in corporate accounting and reporting, using available data for environment, social and governance (ESG) scoring are in their infancy. Nature-related concerns are not yet being considered by most financial institutions and corporate reporting on environmental issues are often boiled down to climate (Adler *et al.*, 2018). There is an increasing awareness among investors that their investments are having a direct impact on biodiversity and that deterioration of ecosystem services will impact financial returns (PRI, 2020).

Biodiversity data in environment, social and governance scoring has been called for, along the lines of climate risk, in order to integrate nature into investment decisions (WEF, 2020). Despite recent international consolidation in climate disclosure guidelines of the task force on climate-related financial disclosures they do not represent a template for biodiversity disclosure. For-profit biodiversity conservation investments remain negligible to and largely outside of global capital flows (Dempsey & Suarez, 2016). A review of the data sources for the risk and opportunities components of the sustainability score reveals limited information on corporate biodiversity impacts showing that data providers are not capturing physical impacts and financial materiality (TCFD, s. f.). Tools to accurately and consistently measure impact and dependencies on biodiversity are lacking (TNFD, s. f.).

Several financial institutions, government and multinational companies have initiated the task force on nature-related financial disclosures intended to help corporates measure, disclose and minimise their nature-related financial risks. For future transformation of investment criteria there will be a need for a framework for nature risk as parallel to climate risk and for data providers and investors to engage with companies on biodiversity disclosure, to encourage them to provide relevant biodiversity information (Global Canopy & Vivid Economics, 2020) (Annex 4.12).

values of ecosystem services *"forgoes opportunities for major enhancements in ecosystem services, with negative consequences for social well-being"* (UK NEA, 2011) and called for greater inclusion of non-market values in decision-making. The natural capital committee (NCC) was established in 2011 to advise the government on sustainable use of natural capital, reporting directly to the economic affairs committee of the cabinet. The environment white paper (Great Britain & Department for Environment, 2011) took mainstreaming the value of nature in decision-making as a defining theme. The Natural Capital Committee functioned until 2020 producing annual reports (Great Britain, 2020) on the state of United Kingdom natural capital and advice on issues such as accounting for the value of nature, restoration of natural capital, and the economic case for investing in natural capital.

Defra and the Office for National Statistics (ONS) published a roadmap for natural capital (2012, 2015, 2018) (Connors, 2018) and the office for national statistics now publishes both environmental accounts (Thomas, 2020) and natural capital accounts (Dutton & Engledew, 2019). In 2014 the government commissioned the national ecosystem assessment-follow-on (UK NEA, 2014) to further develop and communicate the evidence base and enhance its relevance to decision and policymaking across the United Kingdom. In 2017, the natural capital committee (Natural Capital Committee, 2017) recommended the development of a 25 year environment plan and major revisions to the HM Treasury Green Book (HM Treasury, 2018). The resulting plan (HM Government, 2018), *a sister document* to the clean growth strategy (HM Government, 2017), draws together many targets and strategies, with a central focus on protecting and growing natural capital (Curnow, 2019). The forthcoming environment bill (Parliament UK, 2020) will provide the statutory instruments for achieving these goals.

The Green Book revision (HM Treasury, 2018) saw greater emphasis on valuing non-market impacts, measurement and monitoring of natural capital stocks, and recognition that cumulative effects on natural capital of multiple decisions must be considered, measured, and valued (Natural Capital Committee, 2020). Lower discount rates for health impacts were introduced. In both cases, much of the substance already existed (HM Government, 2018), but dispersed across different strategies and guidance, applied in a piecemeal fashion (Tinch *et al.*, 2014). A key innovation is the plan pulling everything together under a coherent framework. Evidence of policy mainstreaming is the incorporation of the plan in the manifestos of all major political parties and in its launch in the first environment-focused speech by a British Prime Minister in 17 years (Greenhouse, 2018).

Alongside these processes, there have been major efforts in developing evidence and tools for natural capital valuation (Özdemiroğlu, 2019). Defra has drawn together tools, data sets and case studies to publish extensive guidance on enabling a natural capital approach (ENCA) (Government UK, 2020), supporting decision-makers and analysts in applying Green Book principles. Corporate natural capital accounts have been compiled by many United Kingdom public sector bodies and private companies (Dickie & Neupauer, 2019). Valuation evidence is being used to justify investment in natural capital, for example in catchment management (Mathieu *et al.*, 2018). The treasury commissioned an independent global review of economics and biodiversity (Dasgupta, 2021) (see Chapter 3) (Annex 4.11).

4.6.5 Uptake of ILK in legislation, policy and planning

Uptake of ILK in policy and planning shows how decision-making processes consider diverse knowledges and diverse values in legislations, policy instruments and plans[28]. Revised legislation which includes participation and influence of local community values on juridical valuation processes shows a scarce operationalisation of laws that have been achieved **(Table 4.4)**. Similarly, the design and management of policy instruments such as protected areas, including (indigenous) community conserved areas (CCAs) show inclusion of diverse values and indigenous and local knowledge (ILK), as well as active participation of local communities. In contrast to standard top-down approaches in protected areas, community conserved areas have had positive impacts through, *inter alia*, food security, improved education, reef recovery, more resilient fisheries, and higher levels of biodiversity (Davies *et al.*, 2013). The latter also demonstrates negative impacts such as higher rates of soil erosion outside the protected area, deterioration of farm economies, and exclusion of some local peoples (see 4.5.2) (Tran *et al.*, 2020). Another policy instrument particularly relevant before the implementation of infrastructure projects (dams, mining, etc.) is the free prior and informed consent (FPIC) (Menton *et al.*, 2020). Evidence illustrates that the interpretation and application in practice of FPIC remains contested and has not translated into a veto power over socio-environmentally disruptive projects (see 4.5.5). In line with this, analysing cases with the decision-making typology (DMT) general framing (see Chapter 1), overall, it is found that the capacity for a plan (e.g., new modes of environmental governance; planning for use of natural assets and nature's contributions to people) to meet its objectives may depend on including the values with the highest incidence (Annex 4.13) (e.g., Millner *et al.*, 2020; Whyte *et al.*, 2019a). In particular, if the aim is the equal distribution of nature's contributions to people between different local communities, more plural valuations can be needed. When the purpose is the effectiveness of a project in a management context, those values which are most likely to affect the functioning of the project can be prioritized given the interests, influence and resources of key actors (see 4.4.2) (e.g., Kochnower *et al.*, 2015; Semitiel-García & Noguera-Méndez, 2019; Stryamets *et al.*, 2020).

Land planning of indigenous peoples and local communities has implied up to today differential power relations (Ioki *et al.*, 2019). Careful attention needs to be paid to genuinely achieving equitable outcomes by underlining the presence of IPLC, their occupancy through stories connected to land, places associated with names, the persistence of their local knowledges and values that link people to and enable sustainable relationships with nature and enhance their agrobiodiversity (Altieri & Nicholls, 2012). Thus, a cultural-based approach to land management, food, sovereignty, and environmental governance has taken place in different regions by emphasizing cultural diversity and the contribution of IPLCs' diverse values to global food production (i.e., farms <2 ha produce 30-34% of the worlds food and 30–34% of food supply on 24% of gross agricultural area, Ricciardi *et al.*, 2018). These efforts align with the sustainable development goals, which can serve as an important instrument for promoting plural perspectives and innovative ecological contexts as drivers for change. In particular, co-management / co-design of protected areas that include diverse and intangible values of nature have shown increased cultural well-being for local communities (Menton *et al.*, 2020). Indeed, indigenous peoples and local communities (IPLC) have made vital contributions to meeting global goals and biodiversity conservation through values, ways of life, management systems and local economies (Forest Peoples Programme, 2020). In this way, the pursuit of self-determined development and inclusive decision-making based on participatory approaches have led to considerable rises in studies and research conducted by IPLCs into the impact of land planning on their quality of life.

Local knowledge of nature is grounded in cultural institutions and practices. It can reduce risks during rapid environmental change and lead to insights into sustainable management. Given that ILK can also influence the adaptability of socio-ecological systems to address complexity and uncertainty, it has the potential to generate a paradigm change in policy and biodiversity conservation (Pauli *et al.*, 2016). Land-use and occupancy studies are one of the forms of ILK uptake that document values and worldviews seeking to enhance policy planning and projects, as well as reducing potential conflicts. Those studies conducted with IPLC expose the diversity of values deeply entrenched in local languages, knowledge systems and practices about nature. In this way, impacts of large infrastructure projects and land planning can be foreseen, mitigated, or avoided by using data based upon ILK criteria of social and environmental metrics reported in this type of studies (Mbilinyi *et al.*, 2005). Likewise, promoting diverse values and worldviews across landscape, customary sustainable use, and small-scale production contribute to sustainable and resilient economies. Therefore, ILK uptake case studies show that a significant part of the conservation of the world's remaining biodiversity depends on institutions, distinct values of nature, different forms of knowledge and actions of IPLC worldwide across scales and governance spaces (see 4.4, 4.5).

The cases evaluated here shine light on decisions and policy uptake of ILK by revealing the reciprocal relations between territory and culture as well as governance institutional arrangements for sustainable use of biodiversity and its values. In this way, valuation purposes of several IPLC

28. Literature review on values considered in decision-making contexts at local level (https://doi.org/10.5281/zenodo.4396271).

show informative, decisive, and technical goals (such as river management planning; restoration programmes for lakes; consensus on the land use zoning; co-design and management of a overlapped areas, etc). For instance, substantial work has been done on the declaration of tangible (nature, biodiversity, and ecosystems) and intangible (extra-physical or metaphysical knowledge) entities as subjects of rights. **Table 4.4** focuses on recent innovative legal rights for nature i.e., giving voice to nature by granting its legal personhood (Annex 4.13). This involves recognizing nature -either as a whole, or a specific part, such as a river- as a legal person (O'Donnell & Talbot-Jones, 2018). Methods here entail processes that gave rise to those legal instruments. By contrasting methods of juridical valuation, nature elements protected, strengths, and weaknesses, this analysis suggests that recognizing rights to nature reflect institutional settings to address socio-ecological and economic problems (Berros, 2017; Kang, 2019). Despite considerable advancement in accomplishing this type of participatory regulations, the degree of implementation in decision-making, their effectiveness, efficiency, monitoring and social equity remain unclear.

Table 4 4 **Legal rights for nature by contrasting methods of juridical valuation, nature elements protected, strengths, and weaknesses.**

Methods	Policy instrument	Nature (or a specified part) recognized with legal rights	Strenghts	Weaknesses
LEGISLATION Elected constituent assembly. participation & representativeness.	2008 Rights of nature or Pacha Mama. Constitution of Ecuador. Chapter seven.	Nature: the right to exist, the right to its integrity, to regenerate, to its vital cycles and the right to be restored.	Acknowledging nature as a legal subject and legal person with subjective rights. Nature as a nonpassive actor (Kersten, 2017).	There are no mechanisms for enforcing rights. Flexibility to interpret regulations. The enforcement of the rights depends on the will of the government and an active society. There was no significant change in relation to property rights (Sólon, 2018). Financial support was not included.
NOMINATION BY INDIGENOUS AUTHORITIES The nomination was initiated by the communities concerned and the state endeavoured to ensure their wide and active participation; their free, prior and informed consent was demonstrated.	2011 Declaration of traditional knowledge of the Jaguar Shamans of Yuruparí as intangible cultural heritage of humanity by Unesco (Decision 6.COM 13.9; since 2011). Colombia	Indigenous knowledge and practices concerning nature and the universe; social practices, rituals and festive events.	Promotion of respect for cultural diversity. Encourage dialogue concerning ILK and practices. Active participation of the communities concerned.	Minor role of state in safeguarding the intangible cultural heritage. In practice, a lack of projects that operationalise the safeguard (Borda Moreno, 2020). Financial support was not included.
LEGISLATION Elected constituent assembly, participation & representativeness. Direct public referenda. Background event (Cochabamba, Bolivia, 2010): The world's peoples conference on climate change and the rights of Mother Earth	2012 The law of Mother Earth. Law 71. Plurinational State of Bolivia Asamblea legislativa plurinacional.	Mother Earth as a whole and for 'all beings of which she is composed': rights to life and to exist; to be respected; to regenerate biocapacity and to continue vital cycles and processes free from human disruptions; to maintain identity and integrity as a distinct, self-regulating and interrelated being.	This approach views humans and nature as part of the Earth community Rights need to be regarded as the rights of the whole and all its beings and not only of the non-human (nature) part.	Time-consuming and hence costly. Difficult to reach consensus among interests of local peoples to govern themselves according to their own customs and the centralized decision-making (Postero, 2020). The ombudsman of Mother Earth (Defensoría de la Madre Tierra) oversees the compliance and enforcement of those rights. However, it has not yet been put in place (Sólon, 2018). Financial support was not included.
JUDICIAL DECISION Atrato river community councils demanded the right to legal tutelage to halt the extractive export model (mega-mining and over-exploitation of forest resources and timber).	2016 Declaration of Atrato river as subject of biocultural rights, Constitutional court ruling T-622, Colombia	The Atrato river, basin and tributaries/affluents as subject of rights to protection, conservation, restoration and management by the state and ethnic communities.	Panels to negotiate agreements. Public consultation with 26 responses. More inclusiveness and visibility of indigenous and tribal communities (Afro-descendants)	Lengthy time for administrative processes. There are many governmental sectors in different administrative levels related to decision-making. Financial support was not included.

Table 4 4

Methods	Policy instrument	Nature (or a specified part) recognized with legal rights	Strenghts	Weaknesses
LEGISLATION Public consultation, panels and public hearings.	2017 Yarra strategic plan Yarra river protection, Parliament of Victoria, Australia	The Yarra river: river ecosystem providing material, non-material and regulating nature's contributions to people.	Broad inclusiveness and representativeness. Financial support is included (Levy-legal seizure to satisfy a tax debt). Body corporate: legal person with the capacity to hold water rights; an independent decision-maker for the river (O'Donnell & Talbot-Jones, 2018).	The extended period of time for public submissions, revision, approval, amendments.
LEGISLATION The Te Awa Tupua (Whanganui River Claims Settlement) Act 2017 was passed as a Treaty of Waitangi settlement agreement after eight years of negotiation by Whanganui Iwi (tribe) and the Crown.	2017 Legal personhood to the Whanganui River. Te Awa Tupua (Whanganui River Claims Settlement) Act. New Zealand	The Whanganui River and its catchment; it creates a new governance framework for the river. It acknowledges the river as a living whole that stretches from the mountains to the sea, including both its physical and metaphysical elements.	Financial support was included (dedicated funding). Strategy group develops and approves, reviews, and monitors the implementation of a strategy document.	The legislation specifically precludes the creation of rights to water, and, as a result, the long-term role of Te Pou Tupua in water use decisions remains unclear
JUDICIAL DECISION Young people in the 7-25 age group demanded the right to legal tutelage for the immediate protection	2018 Declaration of Supreme Court: Court ruling STC4360-2018-00319-011. Colombian Amazon region.	Colombian Amazon as subject of rights, protection, conservation & restoration.	Commitment to formulate an intergenerational pact for life with participation of the affected parties, scientific org. and the general public.	A lack of implementation and operationalisation of measures addressed to substantially reduce deforestation in the required temporal term. Financial support was not included.

4.6.6 Valuation uptake brightspots

Previous sections in this chapter have documented blindspots in the published valuation literature with regard to uptake by stakeholders for informative, decisive and technical policy design purposes. The studies in this subsection demonstrate brightspots of valuation uptake that recognise, demonstrate and capture value (TEEB, 2010) for different informative, decisive and technical policy design purposes (defined in 4.6.3). The studies address different contexts of valuation applied at local, regional and national scales, at different resolutions and for different purposes, in different phases of policy issue cycle (see 4.6.2). The examples demonstrate overcoming different barriers to uptake to connect the supply of valuation knowledge to stakeholder demand for valuation for informative, decisive and technical purposes. Studies include:

- Case #1: use of ILK valuation to support the declaration of Atrato River as subject of biocultural rights in Colombia
- Case #2 Monetary valuation of forest ecosystem services for the design of a headwater conservation tax in Kanagawa, Japan
- Case #3 Monetary valuation of the restoration of Lake St Lucia in South Africa
- Case #4 Deliberative valuations of nature in support of United Kingdom marine and coastal policy
- Case #5 Using multi-criteria decision analysis for collaborative development of a sustainable regulation policy for a large regulated lake, Finland
- Case #6 Benefit transfer in cost-benefit assessments of United States federal regulation under the clean water act
- Case #7 Implementing gross ecosystem product (GEP) for multiple purposes in Lishui, China.

Each valuation uptake case study includes a supplement where further details are provided on barriers to uptake that were overcome in that particular setting.

VALUATION UPTAKE CASE #1: Declaration of Atrato river as subject of biocultural rights, Colombia

Context. Chocó area is one of the richest natural, cultural, and ethnic territories in the Pacific region. The Atrato river flows from the mountains in the south to the sea in the north of the Chocó zone. A diversity of relational, instrumental, and intrinsic values of nature, land, and rivers coexist in the Atrato basin based on different types of worldviews and territorial organization i.e., collective territories for 591 black communities, ~116 indigenous lands/*resguardos*, mixed-race *(mestizo)* communities, and two protected areas. The continued existence and survival of these local communities is inextricably linked to the territory and its resources. People see and interact with the river and forests based on specific values (e.g., religious, political, social, economic, and recreational values). Despite this, instrumental values associated with extractivism (e.g., large-scale mining) have become dominant in management decisions at regional level since the decade of the 1980s. That is an issue that has impacted on traditional ways of life, schooling, self-sustainable agroecological practices, subsistence crops, and artisanal mining *(barequeo)*. Broad values of living together, peace, security, solidarity, and ethnodevelopment have also been affected as a result. Serious environmental consequences are such that it has become a priority issue (i.e., deforestation, river pollution, land degradation) at national and international level (Annex 4.14).

Purpose and valuation methods. Associations of the Atrato River community councils acted on their own initiative to meet together and reflect on adverse changes affecting the river. The initiative was supported by other institutions i.e., two universities, two research institutes, the diocese of Quibdó city, a non-governmental organization. Participative meetings and deliberative valuations (i.e., statement-based methods: free-flowing group-based discussions and formative sessions of focus groups) made explicit other river values assessed (e.g., effect on freshwater fish species) and gave rise to establish a legal tutelage of the river to the constitutional court in 2015. As a result, the court directly conducted a judicial verification inspection visit with a public hearing; participated in social forums including the community assembly with a river journey, and a helicopter overflight. In a 2016 ruling, the constitutional court recognized the Atrato river and its tributaries biocultural rights as a legal person (Corte Constitucional de Colombia, 2016) by the uptake of diverse values of the river and designating two river tutors: the guardian commission conformed by local actors and the ministry of environment. Thus, the goal of valuations had informative and decisive purposes in the respective phases of the policy issue cycle (agenda setting and policy formulation).

Achievements and barriers in the policy issue cycle. Collective work between the above stated organizations made valuation uptake possible in the court ruling, supporting the policy cycle. Three action lines have been set forth as part of the empowerment of local communities i.e., pedagogy; political incidence; non-formal education. A lack of political will and unfamiliarity with territorial ethnic processes were barriers that were overcome in the policy cycle. In many instances, however, an ineffective coordination and a lack of a power-sharing mechanism between stakeholders located at different spatial scales have obstructed progress through the policy cycle (e.g., ministries at national level; regional governments and environmental authorities; municipalities, community councils and indigenous *resguardos* at local level). There are still several obstacles to the full implementation of the ruling, such as the guaranteed availability of resources (budget, personnel). Recognising and empowering the local ethno-developing values can enhance both nature and rural well-being in Chocó region. See Annex 4.14 for further case study context and a more detailed analysis of overcoming barriers to uptake.

VALUATION UPTAKE CASE #2: Valuation of forest ecosystem services for design of a headwater conservation tax in Kanagawa, Japan

Kanagawa Prefecture, Japan, which is 30 km West of Tokyo **(Figure 4.17)**, has long been an industrial agglomeration with a population density more than ten times the national average. Rapid increase in water demand led to 10,400 million JPY (roughly 1,200 JPY per person) of additional annual expense to conserve headwaters (Takai, 2013) by the Kanagawa Prefectural government. The government planned to introduce a new headwater conservation tax (HCT) for conservation of headwaters. In the tax design process, the government contracted an economic valuation study to estimate the value of forest ecosystem services in the prefecture. A valuation was conducted by a researcher in 2002 (Yoshida, 2003, 2004a, 2004b).

The valuation results were compared with the conservation cost to find out the cost is within residents' willingness to pay which was seen as a decisive purpose. Secondly, the valuation was used to prove that there is no difference in willingness to pay for each river basin, and the results were used as the basis for uniform taxation throughout the prefecture. Third, the results, which showed that the willingness to pay positively correlated with income, were used as part of the basis for introducing proportional taxation in the headwater conservation tax. The latter two usages were regarded as technical purposes. The second economic valuation was conducted in 2014. The results were used to prove that the current tax level is reasonable, which was categorized into informative purposes.

When applying the hypotheses for valuation uptake to this case, of total 12 hypotheses, two are irrelevant, and seven out of the remaining ten have been addressed. In

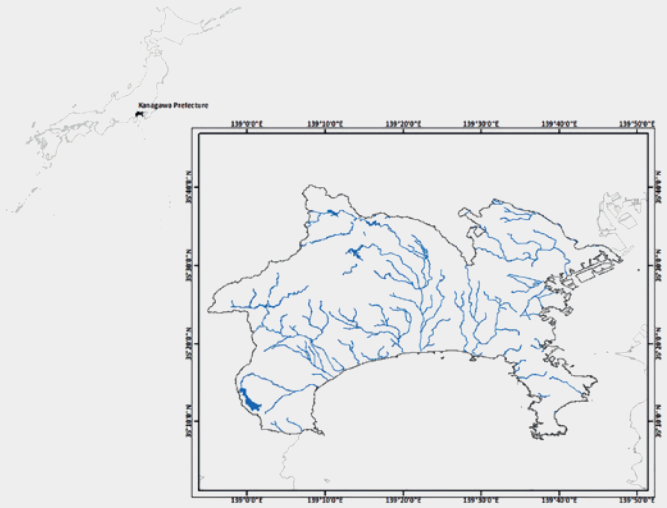

Figure 4 17 **Map of headwaters and rivers in Kanagawa Prefecture.**

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the Kanagawa case, the government corresponds to most of the hypotheses so that it can be taken up in discussion on the establishment of the headwater conservation tax. The case is demand-driven valuation that the objectives and the purposes of valuation were concreted prior to the initiation of the valuation (Hayashi *et al.*, 2021). Therefore, H1 and H2.1 were well-considered along with the valuation design. In this case, these two hypotheses can be seen as a prerequisite for uptake. See Annex 4.15 for further case study context and a more detailed analysis of overcoming barriers to uptake.

VALUATION UPTAKE CASE #3: Valuation of the restoration of Lake St Lucia, South Africa

Lake St Lucia is South Africa's largest estuarine system and one of the most important in terms of conservation value (Turpie *et al.*, 2002). Lake St Lucia is South Africa's largest estuarine system and the dominant feature of the iSimangaliso Wetland Park, which was inscribed onto the World Heritage List on the basis of its outstanding examples of ecological processes, superlative natural phenomena and scenic beauty and exceptional biodiversity. Its main source of freshwater, the uMfolozi River, was diverted directly to the sea in the 1950s in order to minimise flood risk for sugarcane cultivation, a situation that required ongoing management. The gradual cumulative impacts of this, as well the former value of the estuary, only really became clear when the whole system dried up for an entire decade from 2002-2012, leading to massive loss of biodiversity, the cessation of recreation and tourism, and the collapse of marine fisheries. Restoring over half a century's damage would not only be costly, but posed a risk to the by now well established local sugar industry.

With funding from the World Bank, the iSimangaliso wetland park authority commissioned a study to estimate the current value of the system and the potential costs and benefits of a range of restoration options. These included elaborate engineering solutions to deliver river water without sacrificing any of the sugar estate, leaving the system to return to a natural state on its own, or fast-tracking the recovery of the system by removing the large area of dredge spoil that had been used to divert the river. The study, which was presented in seven volumes (Clark & Turpie, 2014), was undertaken by a multidisciplinary team of researchers, and its credibility was ensured by the participation of a wide range of stakeholders and technical experts who were given the opportunity to make input at regular intervals through the three-year study (Forbes *et al.*, 2020). In addition to detailed hydrological, hydrodynamic and ecological research and modelling, the study included the valuation of selected ecosystem services (Turpie *et al.*, 2014). The valuation study drew on the natural experiment of the decade-long closure of the system as far as possible. Household surveys in the surrounding communities showed that tourism was an important source of employment and that the estuary's natural resources made a significant contribution to local livelihoods. Surveys of tourists and tourism businesses revealed that the area contributed a significant proportion of the province's tourism revenues, and that these revenues were strongly influenced by the health of the estuary. Data from before and after the estuary closure also allowed the quantification of its former contribution to the recreational and commercial fisheries off the coast of northern KwaZulu-Natal. The projected increases in these values as a result of the restoration of the system were considerably higher than the expected sugar production losses as a result of estuary restoration, even without considering its non-use values. Furthermore, the study showed that the best outcome for society as a whole would be obtained by removing the

Figure 4 18 **Schematic diagram of Lake St Lucia and the uMfolozi River, and the location of the "St Lucia Bay" that once existed when their mouths were combined.**

artificial barrier separating the uMfolozi from the St Lucia Lake system (Turpie *et al.*, 2014).

The study led to the government's decision to stop breaching the uMfolozi river mouth and to rejoin the two systems by removing the dredge spoil from the mouth area (Forbes *et al.*, 2020). While this was challenged, the courts found that the sugar farmers did not have the right to manipulate the uMfolozi river at the expense of the Lake St Lucia system (Earth & Life News SA, 2016). This showed that the consideration of environmental costs and benefits in monetary terms can, in some cases, tip the balance for environmental management decisions, even in the face of powerful opposition. See Annex 4.16 for further case study context and a more detailed analysis of overcoming barriers to uptake.

VALUATION UPTAKE CASE #4: Values of nature in United Kingdom marine and coastal policy

The United Kingdom has an extensive and diverse coastline. The sea and coast are central in the cultural history and identity of this maritime nation, play an important role in many people's quality of life, and continue to provide important material and non-material contributions to local people including local identities, livelihoods and health and well-being. This case study highlights the application of two deliberative valuation approaches in local marine policy, with one focusing on agenda setting and the other implementation. Both studies highlight the salience of deliberative valuation for forming shared values for policy, supporting more inclusive and legitimate policy processes (see 2.4.2 and **Box 2.9**). Both studies, in their design, also made direct reference to the CBD ecosystem approach, with the processes explicitly seeking outcomes that supported balancing conservation and sustainable use of the sea.

Orchard-Webb *et al.* (2016) brought together a small but diverse group of local stakeholders within the fisheries local action group, for a three-day deliberative democratic monetary valuation process to form values around local sustainable development policy in Hastings, southeast England. The process followed the deliberative value formation model (Kenter *et al.*, 2016), moving from deliberating on broad values, to applying these to the local context to form specific values, to expressing these in indicators, in this a collectively negotiated social willingness to pay for different sustainable development policies. While the outcomes did not inform a single specific decision, the priorities expressed and some of the policy options formulated were reflected in the local development plan.

Ranger *et al.* (2016) applied the community voice methodology, a sociocultural method linking ethnographic film and deliberation, to consult stakeholders on implementation measures for two marine protected areas (see **Box 2.8**). 41 purposely selected local stakeholders were interviewed to understand their values of the sea. The film interviews were compiled in a documentary, and subsequently debated by 90 stakeholders over the course of three evening workshops in the context of evaluating potential management options. These were first systematically debated using multicriteria analysis, and subsequently voted on. The outcomes were closely reflected by the regional fisheries management authority in the consequent management plan and bylaws. The deliberative process was designed and run by experienced independent facilitators. While the deliberative value formation model again informed the design, the context was characterised by much greater pre-existing stakeholder conflict and distrust, and clear conflicts of interest between participants. As such, there was no aspiration of consensus.

There were several key enablers common to both processes that supported uptake. First, the deliberative model applied was explicitly designed for identifying shared values. This included, in first instance, shared broad values and recognition of each other's specific values of the sea, independent of the decision-making processes. Stakeholders from diverse backgrounds found they had much in common, also in their direct experience of the sea, where for example both fishermen and conservationists expressed overlapping living in nature and living as nature life frames as being very important (see 2.3.2). This supported trust and a more collaborative atmosphere in identifying shared values for concrete policies. Secondly, the process was independently designed and run by experienced facilitators, who explicitly built tools into the process for participants that supported participants to "fill each other's' shoes", and better understand other's values. Thirdly, the processes explicitly acknowledged data gaps and uncertainties and provided space for consideration of both scientific and local knowledge, which allowed fishermen in particular to feel more confident in the outcomes. Fourthly, there was highly considered sampling of stakeholders to ensure inclusion of and balancing of multiple interests, which supported a perception of legitimacy. Finally, both cases involved direct collaboration between researchers and decision-makers, which supported the timeliness of the process and alignment of the scope of the research with the policies that were informed. In both studies, both decision-makers and participants responded very positively to the process, improving trust and building capacity for collaboration. Furthermore, it further impacted on United Kingdom coastal decisions, as it rapidly became considered as innovative best practice across the broader United Kingdom marine policy community and has subsequently been used across diverse contexts (Ranger *et al.*, 2016) (see **Box 2.8**). See Annex 4.17 for references and a full discussion of the context of valuation uptake for this case study.

VALUATION UPTAKE CASE #5: Using multi-criteria decision analysis for collaborative development of a sustainable regulation policy for a large regulated lake, Finland

An interactive multicriteria decision analysis approach was applied in a collaborative process which aimed at improving ecological and social sustainability of an existing watercourse regulation policy in the second largest lake in Finland, Lake Päijänne (ca 1 100 km^2). The primary aim of using decision analysis was to improve communication and common understanding of the very complex decision situation in the steering group of stakeholders, and, thus, to improve joint problem solving. The development and comparison of alternative regulation schemes was a multistage and iterative process (Marttunen & Hämäläinen, 2008). The decision analysis was realized before defining primary objectives for the different weather conditions, and before starting hydrological simulations to evaluate how well these could be met in Lake Päijänne and the downstream watercourse. Only after these simulations, and thorough analysis of alternatives' impacts, was it possible to design recommendations that were acceptable to participants from different parts of the large watercourse.

The steering group consisting of 20 representatives was responsible for presenting recommendations for the future water level and flow regulation policy, including ministry of agriculture and forestry, regional water management authorities, regional councils, timber floating association, hydropower companies, agricultural producers and forest owners, fisheries authorities, fisheries organizations, and the environmental protection authority. Stakeholder were interviewed individually using a multi-criteria decision analysis (MCDA) (e.g., Eisenführ *et al.*, 2010) based on a decision analysis interview (DAI) approach and Web-HIPRE software (Marttunen & Hämäläinen, 2008). The weight elicitation for attributes of the alternatives used a combination of simple multi-attribute rating technique (SMART) and SWING weighting (von Winterfeldt & Edwards, 1986) techniques. In the elicitation the impacts of the ranges of the alternatives were clearly presented to ensure that participants took into account the decision context.

In the decision analysis interview a dialogue between the analyst and the interviewee is essential. The approach pays particular attention to the comprehensive and illustrative determination of criteria weights. The analyst asks control questions to ensure that there are no misunderstandings or major inconsistencies. Participants have the opportunity to first clarify their own opinions about the alternative regulation schemes and their impacts, before starting discussions

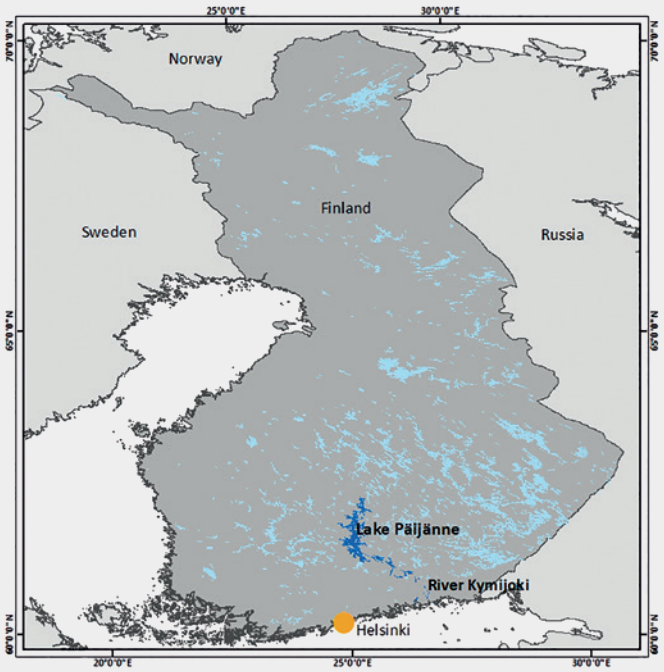

Figure 4 19 **Lake Päijänne.**

about the new lake regulation policy. The decision analysis interview was fully integrated into the real decision-making process. The timing of the interviews in the middle of the four-year project was very opportune. It was vital that there was enough information about the impacts of past regulation practice to assess the performance of the alternatives with respect to selected ecological, social and economic criteria.

Although the starting point for the project was difficult due to a deep lack of trust between the various parties, a carefully planned and structured participatory process with personal multi-criteria decision analysis-based interviews enhanced dialogue and improved participants' learning in several ways. For example, using multi-criteria decision analysis broadened participants' thinking as it became evident that there were many objectives that needed to be reconciled in the water level and flow regulation in this large watercourse, considering different water conditions at different locations. A homogeneous policy would have resulted in unacceptably high damages or disadvantages for some uses. The benefits of applying multi-criteria decision analysis to support participatory policy planning are numerous (e.g., Marttunen *et al.*, 2015). The added-value has been highest in the cases where multi-criteria decision analysis was applied from the beginning of the policy planning process, as in the Päijänne project. It has become one of the most successful water policy projects in Finland in recent decades. See Annex 4.18 for further case study context and a more detailed analysis of overcoming barriers to uptake.

VALUATION UPTAKE CASE #6: Uptake of non-market valuation through benefit transfer in cost-benefit assessments of United States federal regulation under the clean water act

Executive order 12291 has since 1981 required benefit-cost analysis (BCA) for all proposed United States federal regulations, with an effect on the economy of more than $100 million/year, or those designated significant by the office of management and budget (Griffiths *et al.*, 2012). Benefit transfer (BT) is extensively used by federal agencies e.g., environmental protection agency (EPA), to conduct these analyses (Iovanna & Griffiths, 2006), as they are often bound by budget, staffing and timing of the policy processes that preclude the use of original valuation studies using primary data (EPA, 2011). Federal analysts must be prepared to make rapid adjustments to their benefit-cost analysis in response to evolving requests from managers as rule-making proceeds. Benefit estimates may be needed for all households in the nation, making it difficult to conduct new non-market valuation studies tailored to each proposed regulation. This results in a demand for applying existing non-market valuation estimates to calculate willingness-to-pay for new policy cases i.e., "benefit transfer" (Newbold *et al.*, 2018). Nevertheless, decisive use of benefit transfer in the policy cycle depends largely on whether available valuation studies fit an often-narrow set of criteria that are more complex the more location-specific benefits are. The clean water act (CWA) is at the complex end of the benefit transfer spectrum (Newbold *et al.*, 2018).

The United States Environmental Protection Agency developed rules beginning in 1976 for electric generators and manufacturing facilities that take water from coastal and inland water bodies for cooling purposes, based mainly on the pollution risk, but also on impingement and entrainment (I&E) fish mortality through the intake-discharge cycle. It required multiple litigations (Annex 4.19) to enable them to include, in their 2011 report, economic benefits to ecosystems in their required cost-benefit determination of proposed options for existing facilities with cooling water intake structures. An environmental protection agency sponsored stated preference study to estimate total (use and non-use) value of potential improvements resulting from proposed rules could not be implemented because of time constraints. Instead, they used benefit transfer to estimate marginal values per fish to show the benefit to recreational anglers of reducing impingement and entrainment mortality. The environmental protection agency (EPA, 2011) identified a large number of potential studies for benefit transfer (Annex 4.19), but most were disqualified because valuation data could not be correlated with avoiding or reducing impingement and entrainment mortality for specific species / habitats. Uncertainty was mostly evaluated qualitatively, though meta-analysis of recreation values did provide some uncertainty ranges. The environmental protection agency subsequently released improved benefit transfer analyses in their 2014 final 316(b) existing facilities rule (Annex 4.19). Annex 4.19 details barriers to uptake of non-market valuation that have been overcome with the use of benefit transfer in benefit-cost analysis under section 316(b) of the clean water act. Uptake challenges continue regarding compatibility of non-market valuation metrics with species-habitat dynamics and installation-specific impacts. Further refinement of benefit transfer for policy use is evident in the environmental protection agency's 2015 economic analysis on effluent limitations for steam electric power plants. Guidelines have recently been compiled to enhance validity and credibility of environmental benefit transfers (Johnston *et al.*, 2021).

VALUATION UPTAKE CASE #7: Implementing gross ecosystem product (GEP) in Lishui, China

Gross ecosystem product (GEP) is the aggregate value of final ecosystem goods and services in a given jurisdiction (Ouyang *et al.*, 2013, 2020). Gross ecosystem product comprises three categories: material services (corresponding to provisioning services), regulating services, and non-material services (broadly equivalent to cultural services). In recent years, gross ecosystem product has been adopted by many local governments in China as a benchmark for planning, management evaluation, and as a framework for market-based transactions (Ouyang *et al.*, 2020; Pema *et al.*, 2017; Zou *et al.*, 2020). Lishui prefecture in Zhejiang province in particular has made significant advances.

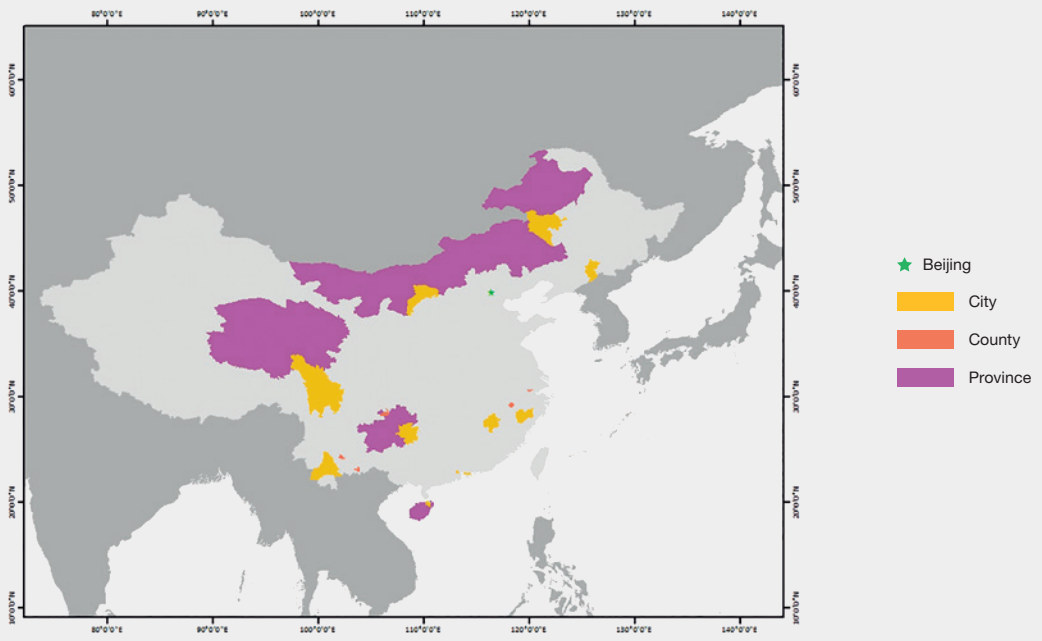

Figure 4 20 **The sites of pilot gross ecosystem product accounting and applications in China.**

Cities: Fuzhou, Ganzi Zangzu, Haikou, Hingaan League, Lishui, Ordos, Pu'er, Qiandongnan, Shenzhen, Shunde, Tonghua. County cities: Arxan, Deqing, Eshan Yi, Kaihua, Pingbian Miao. Provinces: Qinghai, Guizhou, Hainan, Inner Mongolia Note: South China Sea Islands are also part of the pilot, but not shown in this map.

A mountainous area covering 17,275 km^2, Lishui had a population of 2.7 million, mostly rural residents at the end of 2019. The national government designated Lishui as the country's first demonstration site for developing mechanisms to make ecosystem services quantifiable, assessable, and tradeable. To that end, Lishui's framework for implementing gross ecosystem product is known as the "six into" system, whereby gross ecosystem product has been incorporated into six dimensions of local development: planning, decision-making, projects, transactions, monitoring, and evaluation.

In terms of planning, the Lishui government incorporated gross ecosystem product into its local 14th five-year plan for economic and social development, to ensure that gross domestic product and gross ecosystem product grow in concert. For decision-making, Lishui incorporated gross ecosystem product as a criterion for approving large-fund initiatives and into policy design. Projects, refer to ecological conservation and restoration or environmental management (e.g., waste and pollution prevention / abatement). The local government assesses impacts so that gross ecosystem product -enhancing projects are increasingly profitable and those that lower gross ecosystem product pay the price. For the latter, projects are required to engage in offsetting investments on- or off-site. In one notable case in Jingning County, gross ecosystem product fell because of land overdevelopment. In consequence, the project was forced to pay a compensation fee for off-site ecological restoration of more than nine million renminbi (RMB). In just the first nine months of 2020, courts in Lishui concluded a total of 280 such cases, leading to 27 additional ecological restoration sites covering a replanted area of 560 acres.

For transactions, the local government has promoted the creation of "two mountain businesses" to marketize the purchase of ecosystem services. The government has created a purchasing mechanism based on gross ecosystem product calculations and, after accounting for public finances, buys regulating services on the market from "two mountain businesses" that have engaged in ecological protection and restoration. The first such transaction in 2019 was worth 1.88 million renminbi (RMB), a value based on a calculated gross ecosystem product increase of two per cent from the associated ecological protection / restoration project.

The monitoring dimension is focused on establishing a unified statistical system on ecosystem conditions to provide data for gross ecosystem product accounting. In terms of evaluation, gross ecosystem product has been adopted as a key indicator of the effectiveness of county administrators in delivering ecosystem benefits to local residents. Overall, gross ecosystem product evaluation contributes to a system of environmental accountability for administrators, with both "carrots" (e.g., promotion and support for projects) and "sticks" (e.g., demotions). See Annex 4.20 for further case study context and a more detailed analysis of overcoming barriers to uptake.

4.7 MAJOR GAPS AND WAYS FORWARD TO SUPPORT DECISION-MAKING THROUGH VALUE ARTICULATION AND VALUATION

4.7.1 Major gaps in the understanding of values and valuation in relation to decision-making and its outcomes

During the 26th Conference of Parties of the United Nations Framework Convention on Climate Change, in Glasgow, November 2021, a comprehensive report on the status and trends and sustainable development challenges for the Amazon region was released (Science Panel for the Amazon, 2021). In the context of the IPBES *values assessment*, it may be relevant to note that there is no explicit reference to "values" and "valuation" in the 1500+ pages of the report. It is not clear from the report whether lack of valuation content is why the valuation terminology is not used in an otherwise inclusive and broad-based study, but this example serves as a reminder that the diverse values of nature and formal valuation methodologies to express them are far from institutionalized in current policy frameworks, even those most closely related to nature. In this spirit, this final section discusses the knowledge and operational gaps in the use of values and valuation in decision-making, specifically examining the relationships illustrated in **Figure 4.1** relating value articulation and uptake (arrows 1, 2), institutional implementation (2- 5), and outcomes and their feedback effects (arrows 5, 6A-D), with consideration of the power (arrows 3A-D) and knowledge (arrows 4A-D) mediating these relationships.

Gaps relating to value articulation and uptake

Evidence in Chapter 4 on lack of uptake of plural valuation can be explained by resource and technical limitations on engaging with diverse local interests. However, the evidence has been limited by language bias towards English, as well as not being able to systematically review commissioned valuation studies that are not in the public domain. Apart from these practical limitations more research on co-production of valuation knowledge, understanding the role of power in knowledge brokerage, and better adaptation of valuation knowledge to context is called for in this section.

Resource gaps include lacking funding for conducting plural valuation and adequate public consultation, particularly in common assessment contexts such as environmental impact assessments. There is often a lack

of technical capacity in public agencies to commission, carry out and interpret plural valuation processes. In the global south, there is a scarcity of plural valuation that could be at the base of environmental policies, due in part to the lack of interest of national authorities to funding researchers and ecosystem assessments and valuations. Consequently, there is a lack not only of technical capacity, but also of political interest in realizing plural valuations that could consider the local, regional, national interests and values' diversity. Power asymmetries and interest to control territories reinforce the absence of plural valuation processes in environmental decision-making. There are limited resources to engage in validation of knowledge in the communities which will be affected by these decisions. Similarly, there is a lack of funding for system of environmental economic accounting-ecosystem accounting implementation at sub-national and local government levels. There are insufficient resources for collaborative and participatory methods during account compilation processes, combined with limited capacity of those compiling accounts to continuously engage end users of produced information (government).

Making valuation efforts more relevant for decisions requires boundary work to match supply and communication of valuation studies to demand by specific stakeholders in the process. Beyond valuation studies in search of uptake and application, demand-driven valuation studies may be more common than reflected in the literature this assessment has reviewed. With few scientific publications available there is a lack of research on the practice of non-research organizations such as corporations and non-governmental organizations in commissioning ecosystem services / nature's contributions to people valuation consultancies and their degree of acceptance in multi-stakeholder processes.

There is a lack of publicly searchable databases of non-academic publications such as valuation reports conducted by consultants for public agencies. In particular, there is a lack of public searchable databases for environmental impact assessments which would make it possible to conduct systematic reviews of the representation of diverse values in public decision-making. This is necessary to disseminate otherwise privately held knowledge about best practice of valuation uptake in public decision-making. It is also necessary to evaluate the policy impact of research funding for valuation. More generally, there is a lack of English-language systematic reviews of uptake of explicit valuation in national and local policy documents in local languages other than English. Due to the language bias in published valuation research, there is possibly a bias in the literature reviewed here towards institutional settings of the research communities in English-speaking countries.

Further analysis is needed of the relative importance of instrumental and relational value articulations of nature for various types and styles of decision-making, including their balance between rationality and sociality (see 4.2) in relation to stages of issue and policy cycles. Such analysis could contribute to greater relevance of valuation studies and their "packaging" for the specific debates and negotiations they try to support. Instrumental values and their economic representation can justify budgetary allocations at an implementation stage, but relational values speak more to the hearts and can influence goal-setting discussions.

Where "internalization of externalities" is still understood primarily as a call for financial policy instruments, the deeper connections with "in-group" perceptions as a more profound form of internalization (see 4.2) deserves further analysis. This includes understanding of the role relational value articulations play to invoke care, stewardship and taking responsibility for individual and group-level footprints. The process of co-production of knowledge on values, rather than relying on external experts hired to do a job, may become a relevant step towards value-inclusive decision-making, beyond the objective information gathered. A social, political analysis of the processes involved is lacking for many of reported valuation studies, with or without claimed uptake.

This chapter has identified a lack of research on the operational barriers to uptake of explicit valuation outputs in policy cycles, in particular the role of power brokerage of valuation knowledge. Therefore, research is needed on explicit valuation knowledge generated by research as representing, and mediated by particular interests, and its agency and relative power in competition with implicit values of other interest in the policy issue cycle.

Particularly, there are very few studies that address the influence of power asymmetries in the decision-making processes of how values are taken up by IPLC. The existence of communality and communal authorities among IPLC does not mean there is an absence of power asymmetries. In all decision-making processes, dominant narratives and values reinforce the status quo by excluding other actors' worldviews, knowledge and values. But there is a lack of literature that could offer us a clear understanding of how value articulation takes place among IPLC.

Research is also lacking on how plural valuation may unlock transformative change by casting light on implicit valuation biases that explicit valuation exposes to all stakeholders involved. This includes research on valuation "zero-sum games", "crowding out", "moral hazard" of implicit values by explicit valuation – that is, whether promoting plural valuations then will deny or ignore implicit valuation. Limited research also relates to the representation of knowledge and values held by local stakeholders and indigenous people in decision-making. Research is needed on the extent to which explicit valuation methods representing them

determine the effectiveness, and social equity of project and policy outcomes relative to competing non-local knowledge systems and values.

Gaps relating to institutional implementation

There is evidence of a communication gap in a number of countries between the agencies compiling system of environmental economic accounting-ecosystem accounts and those that are reported by focal points of national biodiversity strategies and action plans. Focal points such as ministries of environment should theoretically be best informed of national environmental decision support tools. Engagement early in account compilation is key for trust building which will enable uptake. This is arguably more important than the typical practice of engagement after valuation and accounts have been compiled (e.g., presentation of a report in a big final workshop hoping for its use). Low engagement may also be due to lacking financial and human capacity resourcing of public agencies charged with public hearing processes. Many national biodiversity strategies and action plans also fail to report on valuation of biodiversity and ecosystem services that actually is taking place in a country. This can be interpreted as a lack of awareness in some national environmental agencies of accounting and valuation practice (knowledge gap). In other countries not reporting on Aichi target 2, but which are known to have national valuation research, it could indicate that explicit valuation is actually not significant as policy decision-support.

There is a growing literature on how policy discourse, design of policy instruments and the implementation processes used can reduce the risk of negative value externalities on intrinsic motivation (or even create positive ones). Several knowledge gaps still exist in the understanding of how and when appeals to collective action and responsibility can work, how the introduction of rules can undermine voluntary commitment, and how rules and motivation-based roles can synergize rather than clash. The recent and ongoing global experience with pandemic control may provide lessons for the way other global crises can be managed. By and large, the effect of different framings and / or arguments persistent in a given policy discourse on intrinsic motivations is not well understood. The available evidence is inferred from studies not measuring intrinsic motivation directly, but relying on related variables (such as policy support, interest in conservation tillage, etc.). Therefore, there is a need for more in-depth evaluations of the potential impacts of instrumental and non-instrumental arguments (or a combination of both arguments) on intrinsic motivations for conservation. It should also be noted that most of the available evidence is suggestive rather than definitive. That is, very few studies actually test the motivation crowding mechanism rigorously. Rather, most studies put it forth as a potential underlying mechanism explaining the results on behavioural outcomes.

In future research, a meta-analysis could aim to extract insights that cut across the individual studies. However, the disparate research designs make this challenging.

More studies are needed on the motivational and behavioural aspects of variety of policy design and implementation features, particularly on:

- the impacts of their framing, for example testing whether framing payments for ecosystem services as a compensation, reward or co-investment rather than payment can help to reduce crowding-out or even induce crowding-in of intrinsic motivations for nature conservation,
- the impact of different types of conditionality on motivation crowding, for example whether reducing the degree of conditionality can help avoiding crowding-out,
- the impacts of specific elements of participation and combinations of these in the processes of decision-making that develop the policy instruments,
- which participative, collaborative or self-governing approaches can reduce the tendency for economic incentives to crowd out intrinsic motivations for conservation.

Such studies should cover a variety of countries, cultural contexts and community types and follow a comparable, rigorous methodology. Lab-in-the-field experiments including a no-policy baseline and a post-policy stage would be particularly useful in this regard, as are studies directly measuring different types of motivations (e.g., financial vs. pro-environmental vs. social).

More studies that explicitly consider the interaction of policy variants with contextual factors would be helpful, as for example, the study by Lliso *et al.*, (2021) assessing the impact of value framing for three different community types. To better understand the link between value framing and pre-existing human-nature relational models, studies from countries other than Colombia are needed to assess the generalizability of results and to appreciate contextual factors that require local fine-tuning before positive experiences can be replicated.

There are not enough studies that show how values are considered by formal and informal institutions; and even fewer on how these values are highlighted or obscured by social heterogeneity and asymmetrical structures. In general, comparable studies from different socio-cultural contexts, for example different levels of development, more collectivist vs. more individualist cultures, community types differing on the hedonic / eudaimonic spectrum, would be helpful to interpret the effectiveness of policy instruments for various contexts.

Gaps relating to outcomes and feedback effects

There is a major knowledge gap, as well as an implementation gap, linking specific valuation methods to different decision outcomes or impacts, as part of the overall adjustment of human activity to align with SDGs. Studies focusing on impact evaluation are rarely able to reconstruct the information feeding into the decision that causes the outcomes (positive or negative), and studies focusing on uptake of valuation are rarely (if ever) tracked through a policy or project cycle to monitor the impacts of the resulting decision. This is also connected to a resource gap, since conservation funding is often directed toward implementation to the exclusion of monitoring.

Furthermore, impact evaluation processes that integrate diverse local values in local-scale or voluntary interventions, such as protected areas (see 4.5.2), payment for ecosystem services (see 4.5.3), or certification of sustainable production processes (see 4.5.4), may not address large-scale and indirect drivers of land conversion and biodiversity loss. Addressing such drivers is imperative to reduce implementation gaps between high-level goals and grounded reality. However, understanding is lacking about the implications of protected areas and payment for ecosystem services for larger-scale transformative change, based on off-site and indirect impacts, including leakage of prohibited land uses beyond project boundaries, and their role in transforming governance institutions in diverse contexts. Similarly, assessing the long-term socio-environmental benefits and costs of large dams and mines and attributing them to specific projects is challenging, and rigorous and comprehensive ex-post studies are scanty.

Conflicts are common when negotiating decisions about nature and the diverse values stakeholders may hold for it. Greater diversity of values comes with the potential for clashes between different values, especially when power asymmetries prevent the full diversity of values from being represented. It is well documented that articulating ignored values is a key factor in surfacing conflict, and that non-participatory or coercive decision processes can exacerbate or prolong conflict. However, some conflicts are unavoidable because certain values cannot be reconciled, and conflicts are also sometimes helpful in raising the levels of awareness and policy interest for an issue. A key knowledge gap in understanding decision outcomes related to conflict is the degree to or means by which conflicts can be leveraged as a catalyst for transformation of values, decisions and society. Not all conflicts are negative outcomes, if they lead to meaningful realignment of values with sustainability and justice.

Tracking more diverse outcomes and understanding the interactions between them is another important gap that needs to be filled for more effective management and decision-making. Despite goals for conservation programs being as diverse as biodiversity itself, reductionist measures such as forest cover dominate the ecological values in assessing outcomes. Economic values are much more common than any other social values in formal impact evaluation, especially when standardizing across sites or in large-scale reviews. The need for diverse values is also apparent in ex-ante evaluation of impacts, formally environmental impact assessment, for large infrastructure projects like mining and dams, which tend to focus on predefined material impacts, leave out relational values, give lower weight to interests of marginalized people, and assume that negative impacts can be simply compensated for through material compensation. Outcomes for justice (mainly procedural and distributional) are tracked much more frequently than long-term and large-scale transformation toward sustainability. Interactions between outcomes, like the extent to which program sustainability is impacted by perceptions of justice or how long-term material well-being is supported by the sustainability of nature's contributions to people is assumed but rarely documented. A clearer chain of evidence is needed to assess whether certain outcomes are primary and must be managed for while others are secondary and emerge in response to primary outcomes.

Overall, qualitative studies are under-represented in literature reviews, which represents not so much a gap in knowledge as a disjuncture between the large body of qualitative, ethnographic case-study literature and the current trends in the review literature. This is significant, as methodology of impact assessment has been shown to influence results, with qualitative research demonstrating more negative social and environmental impacts in payment for ecosystem services, for example (Blundo-Canto *et al.*, 2018; Calvet-Mir *et al.*, 2015).

4.7.2 Addressing knowledge and implementation gaps

This section discusses ways forward to address knowledge and operational gaps uncovered in this chapter, organized by the themes that have structured this chapter.

Sharing the responsibility of value articulation and uptake

This assessment has provided evidence of a research gap in documentation of the uptake and outcomes of valuation in public decision-making about nature. Moving forward, commissioners of research in the public interest could increase funding to valuation research that is iterated over policy cycles, and evaluates valuation purposes and impacts relative to outcomes. This will require programmatic and participatory research, which is more costly, but has superior decision-support value. Generating

this knowledge requires research funding that is more predictable and stable. The complexity of the knowledge generation task required to steward nature during global change is beyond the capabilities of the public sector in most countries – it cannot be their sole responsibility to generate valuation knowledge for the common good. Policy mixes should be developed that both nudge and oblige business and finance to share the burden of data production and co-fund valuation knowledge. This includes making valuation studies commissioned by public bodies to private consultants subject to constitutional rights to environmental information (re. Aarhus Convention). This requires additional funding for searchable valuation repositories that follow FAIR principles of findability, accessibility, interoperability, and reusability.

Closing the loops between the policy cycle and valuation process

Public authorities often commission valuation at only single-entry points in the policy cycle – in many countries only for environmental impact assessments in the policy formulation & implementation stage. Valuation could be adopted formally in the ex-post policy evaluation phase to measure policy outcomes in terms of diverse values, and compare them with policy objectives for outcomes. This could promote a demand for valuation throughout the policy cycle, including to inform experimental implementation and adaptive management. Use of valuation throughout the policy cycle would require a transformation towards a common understanding of what constitutes valuation information. It would require a common acceptance – or standardization – of valuation information in so-called "evidence-based" planning and policy-design as well as impact evaluation for adaptive management or iterative decision-making in a policy cycle. It would require funding for integrated assessment, both ex ante and ex post, to be considered an integral part of project, policy or programme investment and operation. This transformation in valuation process requires a transformation in funding for valuation research (which is already under way) towards more participatory, deliberative, and incremental methods.

Evidence from this chapter shows that more participatory and plural valuation processes only serve as vehicles for empowerment of marginalized stakeholders where those stakeholders' rights are recognized, their voices are represented throughout the decision process, and they are given substantial influence over decision outcomes. Diversification of values can threaten the rights of IPLCs, including marginalized peoples, if these processes privilege already-powerful groups. Thus, plural valuation processes should be matched to the level of diversity in decision context, taking into consideration the stakeholders' rights and equity.

Standardization of valuation while representing diverse values

The ideal of integrated valuation (Jacobs *et al.*, 2018) involves tensions and trade-offs. Iterated valuation that allows for comparison of policy performance over time and over policy cycles, requires standardization in order to be relevant, robust and resource efficient. Standardization promotes cost-saving as well as robustness, and as such is a common good for public decision-making. The demand for standardization of valuation is evident in ecosystem accounting at national level for biophysical indicators (e.g., in the system of environmental economic accounting-ecosystem accounting). However, standardization of valuation is by definition in tension with representation of local, context-specific values. A way forward will have to recognise the differential use of valuation at different levels of governance and for different purposes. There is a need for better representation of multiple dimensions of quality of life and diverse values of nature in this chapter's evaluation of the outcomes of decisions as well. Standardization of some valuation methods for certain purposes may be possible (e.g., regulatory environmental standards, biophysical ecosystem accounts), while economic and socio-cultural methods may be more informative if they can be adapted and combined to represent a high diversity of decision-settings and interests (following best practice guidance, rather than formal standards).

Moving forward, awareness is needed that what constitutes valuation knowledge and evidence can be captured by private interests and elites. Like any technology, standards for valuation in the private sector are also a means of competitive advantage, market power and market capture. Ensuring relevant, robust and resource efficient valuation is conditional on how power to generate valuation knowledge is distributed among institutions governing the policy cycle.

To increase the chance of policy uptake of valuation studies, the participation of IPLC will enrich the knowledge, experiences, and values reflected and make positive outcomes for sustainability and justice more likely.

New alliances for generation of knowledge about diverse values

Researchers have a role to play in a shift toward knowledge generation about diverse values including different forms of knowledge. A key step will be determining how to target who they work with; researchers wishing to enable transformative change should consider what the leverage points are for knowledge being most transformative with different actors. Actors as diverse as those in the private sector, government, multilaterals, big non-governmental organizations, and small or local non-governmental organizations require different types of knowledge to be most effective, and researchers would benefit from

partnerships with boundary organizations to help them navigate this space. Such knowledge brokers, sitting at the science-policy interface, can build relationships with different actors and connect researchers where they can be most effective. However, sectoral silos must be broken down to share lessons and strategies across the science-policy interface. While at the level of international conventions, climate change and biodiversity have followed parallel tracks and built separate science-policy platforms, in current public awareness and coalitions for solutions maintaining the boundary appears to be increasingly counter-productive. Deeper analysis of the resistance to change and of vested institutional interests may help find pathways to unleash the potential synergy.

Strengthening the role civil society and civil service in valuation for decision-making

Political power struggles and competition undercut the continuity of approaches ("staying the course" in terms of sustained effort), with values crosscutting through political changes. A strong civil service within government is more stable through political change – for example, statistical agencies tend to remain while ministries may change (and more specifically, the System of Environmental Economic Accounting-Experimental Ecosystem Accounting (SEEA EEA), born of statistical agencies, provides indicators of ecosystem services contribution to GDP accepted across the political spectrum). Long-term research can strengthen local capacities and further empower civil society, providing access to education, information, and communication. National research councils might recognize their role in knowledge generation, promote joint funding involving local non-governmental organizations, who tend to be closer to the local, diverse values, and are able to integrate local stakeholder perspectives. Thus, the ways in which problems are understood, communicated, and discussed need social institutions that can assure the participation of multiple perspectives from different actors.

Brightspots revealing ways forward

This chapter has provided evidence that valuation of nature's contributions to people, including ecosystem services, is more of the exception than a rule in most policy levels and countries. The exceptions are brightspots demonstrating ways forward. Examples reviewed in section 4.6.6 included: recognition by courts of ecosystems as legal individuals with constitutional rights with local communities recognised as custodians, reflecting indigenous communities' living as nature life frame in the governance system (Rio Atrato, Colombia); a headwater conservation tax based on valuation of forest ecosystem services, using repeated surveys of downstream communities' willingness-to-pay throughout the implementation to assess community support and financial feasibility (Kanagawa, Japan); government-led wetland restoration based on benefit-cost analysis integrating hydrological, hydrodynamic and ecological research with economic valuation and regular participation of stakeholders (Lake St. Lucia, South Africa); use of multi-criteria decisions analysis for collaborative development of a sustainable regulation policy for a large regulated lake (Lake Päijänne, Finland); agenda setting and implementation of local marine and coastal policy based on deliberative valuation methods, forming shared values for policy and a more legitimate policy process (United Kingdom); basing local development planning, decision-making, project assessment, off-setting, monitoring and evaluation on accounting of gross ecosystem product at the prefecture (sub-national) level (Lishui, China); and benefit-cost analysis of federal regulations on water quality, using benefit transfer to overcome the limitation of high costs of new non-market valuation studies (United States of America). These brightspots can serve as inspiration or templates for others to follow, or simply build confidence and understanding that such strategies can be successful. In many settings implementing similar approaches are transformative relative to the current situation, in others they are opportunities for further incremental change.

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Chapter 5

Chapter **5**

THE ROLE OF DIVERSE VALUES OF NATURE IN VISIONING AND TRANSFORMING TOWARDS JUST AND SUSTAINABLE FUTURES[1,2]

COORDINATING LEAD AUTHORS:
Adrian Martin (United Kingdom of Great Britain and Northern Ireland), Patrick O'Farrell (South Africa), Ritesh Kumar (India/Wetlands International)

LEAD AUTHORS:
Uta Eser (Germany), Daniel Faith (Australia), Erik Gomez-Baggethun (Norway), Zuzana V. Harmáčková (Czech Republic), Andra-Ioana Horcea-Milcu (Romania), Juliana Merçon (Brazil), Martin Quaas (Germany), Julian Rode (Germany), Ricardo Rozzi (Chile/United States of America), Nadia Sitas (South Africa), Yuki Yoshida (Japan), Tobias Nyumba Ochieng (Kenya)

FELLOWS:
Ann-Kathrin Koessler (Germany), Natalia Lutti Hummel (Brazil), Lelani Mannetti (Namibia)

CONTRIBUTING AUTHORS:
Gunnar Austrheim (Norway), Marta Berbes (Spain/Canada), Matthew Cantele (United States of America/Italy), Joji Cariño (Philippines), Agathe Colleony (France), Rebecca Collins (United Kingdom of Great Britain and Northern Ireland), Paul Chadwick (United Kingdom of Great Britain and Northern Ireland), Klaus Eisenack (Germany), Ellen Guimaraes (Brazil/Germany), Loni Hensler (Germany), María Heras (Spain), Irene Klaver (Netherlands), Rainer Krug (Germany), Sandra Lavorel (France), Jasper Meya (Germany), Fernando Santos Martin (Spain), Francisco Xavier Martínez (Mexico), Melissa Marselle (United States of America/ United Kingdom of Great Britain and Northern Ireland), Thais Moreno (Brazil/Italy), Valerie Nelson (United Kingdom of Great Britain and Northern Ireland), Aidin Niamir (Islamic Republic of Iran), Vânia Proenca (Portugal), Federica Ravera (Italy), Isabel Ruiz Mallen (Spain), Agatha Nthenge (Kenya), Gunilla Almered Olsson (Sweden), Odirilwe Selomane (South Africa), Alejandra Tauro (Argentina), Anne Turbé (France/Israel), Noelia Zafra Calvo (Spain), Yves Zinngrebe (Germany)

REVIEW EDITORS:
Laura Pereira (South Africa), Chuks Okereke (Nigeria)

TECHNICAL SUPPORT UNIT:
Gabriela Arroyo-Robles

1. This is the final text version of Chapter 5.
2. Authors are listed with, in parentheses, their country or countries of citizenship, separated by a comma when they have more than one; and, following a slash, their country of affiliation, if different from that or those of their citizenship, or their organization if they belong to an international organization. The countries and organizations having nominated the experts are listed on the IPBES website (except for contributing authors who were not nominated).

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The designations employed and the presentation of material on the maps used in the assessment do not imply the expression of any opinion whatsoever on the part of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. These maps have been prepared or used for the sole purpose of facilitating the assessment of the broad biogeographical areas represented therein.

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SUPPLEMENTARY MATERIAL

Annex 5.1 Justice and sustainability

Chapter **5**

THE ROLE OF DIVERSE VALUES OF NATURE IN VISIONING AND TRANSFORMING TOWARDS JUST AND SUSTAINABLE FUTURES

EXECUTIVE SUMMARY

The chapter assesses the role of nature's diverse values in supporting social-ecological transformations towards more just and sustainable futures. This is approached as a two-fold and mutually complementing task: a) assessing the diverse values that have been considered in developing and creating visions for, and scenarios of the future, particularly those relating to more just and sustainable futures; and b) assessing how interventions to incorporate more plural valuation into decisions can serve as leverage points for enabling and governing transformation towards just and sustainable futures.

There is a substantial and well-established body of specialised literature on visions and scenarios of socio-ecological futures. A systematic review methodology was employed to assess the role of values and the types of values contained within this body of work. The protocol for this review operationalises the key concepts of "values of nature", "justice" and "sustainability" elaborated within the wider values assessment and in this chapter. This review of published science is complemented with reviews of grey literature and creative arts.

The specialised literature on transformations and transitions to sustainability is comparatively recent and is diverse in terms of its primary concepts and units of analysis. For this reason, a two-stage process of literature review was adopted involving a) expert review to identify and synthesise the main concepts and relationships found in expert selected literatures followed by b) a systematic review using qualitative content analysis and c) a case study of how values are treated in National Biodiversity Strategies and Action Plans (NBSAP) interventions.

The decision-making typology and framework for the values assessment introduced in Chapter 1 is used as a basis for mapping governance forms and their associated characteristics (such as regime fit, scale and interplay, and the degree to which they – foster adaptiveness, knowledge co-production, and emergence of new actors) in the context of governing the uptake of diverse values of nature as part of a process of transformation towards just and sustainable futures.

These broader reviews and analyses are complemented by expert-led case studies exploring the role of values and valuation in four alternative pathways of transformation: green economy, degrowth, earth stewardship, and nature protection.

Understanding the main concepts: futures, transformations, sustainability and justice

1 **Recognising and incorporating diverse values of nature can help ensure that efforts to bring about sustainability are integrated with commitments to advance justice *(established but incomplete).*** Transformations to sustainability involve changes to relationships among present generations as well as to relationships with future generations and other-than-human nature. Whilst it is widely agreed that sustainability will be best served by more just relationships, this has not yet been widely practised. Interventions to recognise diverse values of nature can help achieve this synergy, providing a bridging mechanism between sustainability and justice. For example, recognition of option values makes it clear that sustainability is central to doing justice to future generations {5.1, 5.5.5}. In many cases, the conditions underlying justice and biodiversity conservation are found to be closely aligned. For example, the condition of territorial integrity underlies the wellbeing of indigenous peoples and peasant communities whilst also providing the basis for nurturing and acting on values of care for nature {5.5.4}.

The values of Nature and Nature's Contributions to People, found in just and sustainable futures

2 **Futures thinking and its different types of approaches and methods such as scenario planning,**

and analysis, are powerful tools which can be used to learn about personal and shared values and to motivate value-inclusive decision-making *(well established)*. It can help decide the path to follow and the types/diversity of values that require incorporation in order to get there. Visions of futures integrate and/or balance nature's diverse values and nature´s contributions to people in different ways and to different degrees. The review highlights that certain value mixes will likely result in more just and sustainable futures compared with others. The value mix within the dominant global discourse or business as usual (as it relates to trade, business and environment) will not lead to just and sustainable outcomes in the future. If a just and sustainable future is to be achieved, then this value mix (which is connected to decision-making and actions) needs to change. Futures works provide some indication of which values underpin alternative future development {5.5.2}.

3 Just and sustainable futures are characterised by a strong societal focus and a balanced pursuit of material and non-material benefits *(established but incomplete)*. It was possible to group studies according to seven different future archetypes considered in the IPBES Global assessment on biodiversity and ecosystem services; these being Regional sustainability (29% of the studies assessed), Global sustainable development (20%), Economic optimism (20%) Business-as-Usual archetype (15% of futures), Regional competition (4% of futures), Inequality (3%) and Breakdown (2%). Assessing the relative weightings of instrumental, intrinsic and relational values enabled the allocation of archetypal futures into value foci. Archetypal futures, and their values mixes, which are most likely to lead towards just and sustainable futures (as mapped out according to the multiple SDGs they incorporate) have a strong societal focus, have equally high regard for both material and non-material benefits of nature, are concerned with the diversity of life options, and socio-ecological resilience. Those archetypes that are focused on material accumulation and individual benefit, were found to be the least sustainable, singularly focused on instrumental values, and incorporated a very narrow range of SDGs {5.2.2}.

4 The majority of futures articles do not explicitly address nature, nature´s contributions to people and good quality of life as separate specific but related concepts *(established but incomplete)* but address them either individually, as separate issues or in combinations, such as nature and nature´s contributions to people without a direct link to good quality of life. Nevertheless, the futures reviewed in this assessment included only studies which addressed elements of the IPBES conceptual framework, at least implicitly. The reviewed futures ranged from purely qualitative to quantitative modelling studies {5.2.2}.

5 A vast majority of accessible futures work was created within the research and academia context *(well established)* {5.2.2}. Quantitative assessments of values underpinning different futures are frequently carried out for economic values, while other types of values tend to be assessed qualitatively, e.g., through participatory approaches. Most defined futures are underpinned by multiple types of values. None of the reviewed futures were underpinned by, or explicitly address only a single type of value. Studies explicitly addressing multiple types of values for nature, nature´s contributions to people and good quality of life originated predominantly from local and to a lesser degree, national contexts. The proportion of value-oriented futures studies from global context was minimal {5.2.2}.

6 Futures works have engaged to a degree with stakeholders, but whose values are being promoted is unknown *(well established)*. Information is available on the stakeholders included in scenario development and whose concerns are included. Stakeholders were included in the development of approximately half of the futures, mostly including authorities, individuals, communities and organized groups. Those futures which were co-developed with stakeholders generally addressed how values underpin potential future developments more explicitly, while futures designed solely by researchers or experts generally mentioned the role of values but did not assess their explicit influence on the future, or used some type of valuation but did not explicitly reflect on what types of values these capture. These studies included no information on whose voices were not included in developing the futures and whose concerns and underpinning values are thus not included {5.2.2}. Information is not available on who are the winners and losers under different futures (no explicit information was included in 201 out of 257 reviewed futures). There is a lack of information on whose values are explicitly incorporated into these defined futures, how these would change when different actors are considered, and what the likelihood is of different actors and their alternative values and desired futures being considered. The futures literature rarely provides information on specific actors responsible for individual actions influencing future development (133 futures included no information on specific policies, decisions or actions, and 70 futures included no information on who acts in the specific scenario, vision or pathway) {5.2.2}.

7 The understanding of possible futures is limited by a lack of focus on certain regions and environments *(established but incomplete)*. While the futures encompassed various geographic and temporal scales from local to continental, and years to millennia, most futures capturing trends in nature, nature´s contributions to people and good quality of life while also taking into account values, focus on the local level. The coverage of futures from selected regions, particularly Africa, and futures covering

marine environments, is very weak. Most futures do not include evidence regarding cross-scale interactions (152 – 59%), and in many cases on cross-sectoral interactions (95 – 37%) {5.2.2}.

8 Information about different kinds of future trade-offs is limited *(well established)* (no explicit information was provided in 92 of 257 futures (36%)). Information on trade-offs is largely limited to trade-offs between different kinds of land uses, sectors and nature´s contributions to people/ecosystem services. Trade-offs between different types of livelihoods, interest groups or societal groups were only rarely made explicit in the reviewed futures. Novel thinking on futures is rare, and descriptions of disruptions of different kinds or radically transformative futures, as well as their underpinning values are rare (no information on tipping point/thresholds/ feedbacks in 230 out of 257 reviewed futures; no transformative elements in 233 out of 257 reviewed futures). Justice and equity have only been considered in a limited way in futures works (38 out of 257 futures cases). These relate to general summaries of the inequality levels under different scenarios {5.2.2}.

Mobilizing values of nature to enable transformative change

9 Values are widely considered to be a deep-lying foundation for societal change *(well established)*. IPBES[3] defines transformative change as *'a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values'.* The role that diverse values and valuation of nature can play in enabling such profound and necessary change is explored through a review of academic literature on transitions and transformations to sustainability. Values can intervene in societal change in two ways {5.3.2}. Firstly, interventions can try to change or shift people's values, promoting the incorporation of sustainability-aligned values and reducing non-sustainable-aligned values. Secondly, when people already hold sustainability-aligned values but due to prevailing contexts are not free to act on them (e.g., due to competing motivations, lack of resources, or physical constraints), then interventions can aim to create favourable conditions that enable people to act in ways consistent with their values {5.3.2, 5.3.3, 5.3.4}.

10 Working with values can promote both incremental and transformative change by operating at different levels and spheres of society *(established but incomplete)*. Broad values are associated with points of deeper leverage: aspects of society such as worldviews that may be difficult to change but where relatively small shifts can produce large, comparatively stable and potentially transformative change. Mobilizing more diverse ways of valuing relationships between humans and with other-than-human nature is considered as a necessary (though not sufficient) condition for producing fundamental and system-wide change, for example to the primary goals by which a society measures progress. The kind of values that are dominant in society is determined by power relations, for example because economic and political interests determine which values – and whose values – have most traction in decision-making. Mobilizing alternative and more diverse values therefore involves changing power relations, empowering those whose values have been rendered less visible {5.3.2, 5.3.3}.

11 Transformative change is likely to be served by working to pluralise values and valuation at three broad levels and spheres *(well established)*: firstly, more diverse and inclusive valuation of nature and uptake in practical measures such as incentive schemes; secondly, reforms to institutions that enact more plural and balanced values within system-wide structures; and thirdly, initiatives that link more to the "inner dimensions" of sustainability including individual and social beliefs and worldviews. Change to this subjective and intersubjective domain is considered important for bringing about shifts to societal goals and paradigms, for example if there is to be a system-wide shift in goal away from growth in material consumption. Whilst movement towards sustainability can begin in any of these domains, change is only likely to be transformative if it spreads across all these societal spheres and leverage points {5.3.2, 5.3.4}.

12 Transformation to sustainability is found to require a) a rebalancing of human-human values, away from the dominance of individualism and economic profit towards sustainability-aligned values of collectivism, care and justice; and b) a rebalancing of human-nature values, away from the dominance of instrumental values, towards inclusion of values based on care and respect for other-than-human nature *(well established)* {5.3.2, 5.3.3, 5.5}. The term "sustainability-aligned values" refers to those broad values (e.g., care for nature, solidarity among humans) that are found to be either associated with future scenarios linked to achievement of SDGS or to processes or outcomes of transformative change towards just and sustainable futures {5.2.3, 5.3.2}. Because there are different ways of defining sustainability it is inevitable that there will be different ideas about which values are aligned with sustainability {5.5.1}. Despite this diversity of sustainability scholarship there remains considerable agreement about the kind of broad values that are most aligned with sustainability and the kind of balance of values that is necessary.

3. IPBES. (2019). *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* IPBES Secretariat. 978-3-947851-13-3.

13 Deliberative procedures are found to be a promising form of intervention that can explicitly mobilize and bridge nature's diverse values *(established but incomplete)*. Currently sustainability science is reaching agreement that social values are an important factor in transformative change and an action-oriented strand of this literature identifies ways to engage with diverse values as a contributory process for transformations to sustainability. There is relatively little knowledge about how values operate as a process – as leverage points to promote transformation. The literature emphasizes the role of deliberative processes and co-creational approaches to knowledge production that systematically bring diverse values to the surface and encourage values transparency and associated public dialogue {5.3.3}. This mobilization of diverse values can be challenging, for example where many competing values are surfaced. But it can also produce at least three types of positive contributions towards transformation: (i) richer knowledge, (ii) empowerment of marginalised groups, (iii) reflexivity and social learning {5.3.3}.

14 Behaviour change interventions can close or "bridge" the gap between values and behaviour by ensuring that the various conditions are met that together enable people to act consistently with sustainability-aligned values *(well established)*. Policies for biodiversity conservation will be more effective if they specify the individual behaviour they seek to change and evaluate the potential to influence this behaviour. The psychology literature views values as basic goals that transcend specific situations and affect people's beliefs, attitudes, norms, intentions and eventually their behaviours. It is well established that the holding of values is not a sufficient condition for predicting behaviour, hence scientific research sometimes speaks of a "value-action-gap" {5.3.4}. Behaviour change interventions can "bridge" the gap between values and behaviour by ensuring that various conditions are met. These conditions can be categorised as providing (i) capability, (ii) opportunity and (iii) motivation to act. Integrated frameworks, such as the behaviour change wheel can help unpack which behaviour change interventions are appropriate for targeting these different determinants of behaviour, as well as the policy categories to support specific intervention functions. The analysis of ten National Biodiversity Strategies and Action Plans selected from across the globe shows that while the full range of behaviour change interventions and policies is proposed some intervention types are more prominently used and others tend to be neglected. Many action plans do not specify clearly enough whose and which behaviours are to be addressed in order to meet biodiversity conservation objectives {5.3.4}.

Governing the mobilization of diverse values of nature for change

15 Value choices, on the nature of society desired to live in and to leave for posterity, are linchpins of governance for just and sustainable futures *(well established)*. Governance definitions and frameworks are normative and carriers of values and value systems, with some embracing consensus and empathy, others entrepreneurship and others authority and control. Different governance modes are built around ways in which people consider other peoples' values such as: hegemony (one's values consider as superior to others); separatism (not willing to be confronted with the implications of other people's values); pluralism (being co-responsible for protecting other people's values); tolerance (being sympathetic to other people's values despite knowing that one's values are superior) and indifference (abstaining from intervention due to lack of interest in other's values). Governance choices can become "easy", "moderate" or "hard" due to (in) compatibility, (in) comparability, and (in) commensurability of these values, thus highlighting the significance of meta-governance in setting the values, images and principles as the backdrop to transition towards just and sustainable futures. Incommensurable values, or conflicting and incompatible images and principles may underpin persistence of "wicked environmental problems" {5.4.2}.

16 Governance for sustainability has to cope with fundamental uncertainty and possibility of unintended consequences, while navigating through realms of fragmented power across actors and societal subsystems *(well established)*. The capability of governance regimes to address uncertainty and complexity is enhanced by being: a) interactive (consciously interacting with power centres to define as well as realise goals), b) reflective (reassessing practices and adjust steering mechanism); c) reflexive (calling into question the governance foundations and envisioning alternatives and reinventing aned shaping the foundations); and d) supported by democratic institutions, participation and policy coherence. From a values perspective, governance modes which are flexible, transparent, and promote collaboration, participation, and learning underpin their capability to address complexity and uncertainty. In certain situations, hybrid forms of governance (such as co-management, or partnerships between state and non-state actors) may help address uncertainty, although risks of window dressing in absence of consideration of diverse values and different ethical perspectives remain {5.4.3}.

17 Transformative governance towards just and sustainable futures requires radical, systemic shifts in values and belief, patterns of social behaviour, and multilevel governance *(established but incomplete)*. Transformative governance relies on values that guide action towards transformation and that are embedded in the

selected methods and means of governance (design); and on values embraced on goals, expectations, and societal priorities of the envisioned new system. Central to the consideration of diverse values in transformative governance is a multi-actor approach that widens the scope of participation to a broad set of values and beliefs within society and that guarantee effective participation of the involved ones. Leadership of nested institutions (complex, redundant, and layered) and institutional diversity (a mix of public, private and civil society actors) at the local, regional, and state levels, connected by formal and informal social networks is an important lever for such transformation. Creating space and autonomy for local experiences ("niches") and encourage innovative interventions and the emergence of arrangements inclusive of diverse values within systems; creating an environment for questioning existing values, knowledge and structures; and giving opportunity to experimentation of new ways of governance based on knowledge co-creation and social learning processes are key enablers to manifest a transformation. Transformative governance may be impeded by cognitive limits of humans, inertia of embedded political power relations, and absence of catalytic upscaling mechanisms for nested personal and social transformations {5.4.3}.

18 The promotion of social learning processes is crucial for governance systems that intend to contribute to the creation of just and sustainable futures *(well established)*. Fostering a culture of learning through processes of participatory reflection, decision and action implementation as well as collaborative production of knowledge across different social actors, groups and networks contribute to the recognition, mobilization, weaving, integration and co-creation of diverse values. The recognition and incorporation of diverse values in governance depend on each system's culture of learning and integrative capacities. These capacities generally involve: a) processes of plural valuation linked to negotiation and decision-making outcomes; b) integration of various types of knowledge in governance; c) explicating and reflecting on the often implicit "normative frames of reference" that actors with various backgrounds have; and d) identification and awareness of "the different epistemological beliefs which underpin knowledge claims". Social learning processes for diverse values and plural valuations can be enabled by: a) knowledge co-production; b) creating venues for social interaction with multiple participation in cross-scale linkages; c) fostering time and space for collective reflection and dialogue; d) establishing methods, agreements, facilitation and routines for collaboration and integration of diverse values; and e) fostering attitudes of openness for a transformative experience {5.4.4}.

19 Learning with, from and for diverse values of nature that are held by indigenous peoples and local communities can support governance for just and sustainable futures since IPLCs have key long-term place-based knowledge and values of biodiversity *(well established)*. Creating opportunities for dialogue and direct learning among different social groups can help prevent and resolve conflicts related to environmental injustice as well as promote inclusive and participatory decision-making through the recognition, mobilization, weaving, integration and co-creation of diverse values. Governance models which build on recognition of human rights law and biocultural approaches to conservation can contribute to achieve effective and just conservation outcomes while addressing erosion of both cultural and biological diversity {5.4.4}.

Case Studies of value-centred pathways to sustainable futures: green economy, degrowth, earth stewardship and nature protection

20 There is no single pathway towards just and sustainable futures *(well established)*. Even where nations are able to overcome differences to sign up to a common set of goals (i.e., the SDGs), there are still multiple and contested pathways to achieving these, which stem from different underlying worldviews and values, different views about leverage points for transformative change, and politics. A pathway to transformation is defined as a strategy for getting to a desired future based on a recognisable body of sustainability thinking and practice, driven by an identifiable coalition of researchers, practitioners and advocates. Pathways are differentiated by the kinds of solution framework they propose in response to the biodiversity and climate emergencies. These framings arise from the emphasis placed on different bodies of academic theory as well as different normative positions – knowledge and values are co-constructed within pathways {5.5.1}. Analysis of pathways reveals how complex ways of working with values are pursued in practice, through knowledge-value coalitions that help to give traction to calls to diversify or balance those values that are recognised, measured and incorporated into institutions and policies {5.5.6}.

Four co-existing pathways to sustainability are reviewed. Green economy represents a "nature for society" pathway based on economic theory and leaning towards instrumental values of nature. Nature protection represents a "nature for nature" pathway based on conservation sciences and leaning towards intrinsic values of nature. Earth Stewardship and biocultural diversity represents a "nature as culture" pathway based on sustainability science and local knowledge, leaning towards relational values of nature. Degrowth and post-growth represents a more cross-cutting pathway, based on ecological economics and political ecology, and pluralist valuation {5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.5.5}.

21 Different worldviews and sets of values are prioritised across different pathways *(established but incomplete)*. *Green economy* emphasizes solutions based

on reform to economic performance metrics, institutions and technologies. This solutions framework is underpinned by a conception of nature as an asset to be managed for human wellbeing, highlighting nature's instrumental values {5.5.2}. *Degrowth* is a pathway that emphasizes strategies that reduce the material throughput of society, protecting human wellbeing through better distribution of material wealth rather than growth. This solutions framework stems from a central value to sustain life in all its forms and for humans to live by the value of sufficiency {5.5.3}. *Earth stewardship* is a pathway that emphasizes the strengthening of local sovereignty, including agrarian reform. This solutions framework is underpinned by prioritisation of solidarity, between humans as well as between humans and other-than-human nature. Linked to the science and ethics of Biocultural Conservation this pathway promotes the goal of biocultural flourishing {5.5.4}. *Nature protection* is a pathway that calls for a greatly expanded network of nature conservation areas (such as protected areas) to ensure a future for all life on earth. This position prioritises intrinsic over instrumental values, with protection of biodiversity for its own sake seen as an essential condition for restoring balance between humans and nature {5.5.5}.

22 Each pathway strongly advocates the need to recognise and act upon more diverse and balanced ways of valuing nature as a foundation for transformative change *(well established)*. These four pathways all accept that biophysical boundaries have to be respected, albeit with different views about whether there is still scope for economic growth within these boundaries. All pathways also pay attention to social justice, especially between generations, albeit that the nature protection pathway views this as a separate goal that is secondary to saving biodiversity, whilst other pathways see greater degrees of integration between justice and sustainability. Pathways also tend to emphasize different social justice principles such as maximising utility (green economy), minimum and maximum consumption thresholds (degrowth), rights and empowerment (earth stewardship) and option values (nature protection) {5.5}.

23 Constructive dialogue between these and other pathways, based on transparency and recognition of the diverse values underlying different positions, will itself be crucial to transformative change *(unresolved)*. Each of these pathways has much to offer. All foreground sustainability aligned values and all seek a more balanced future for nature and people. Matching paths to selected or specific opportunities will become a critical task if society starts making shifts towards just and sustainable futures. No single path is presented here as superior over the others. And whilst some crucial common goals are highlighted, there is no agenda to resolve all conflicts between pathways and eliminate differences {5.5.6}.

5.1 INTRODUCTION

5.1.1 Foundation of the chapter

In this chapter the focus is on looking forward, exploring the potential to create a more desirable future, one that is just and sustainable. The chapter defines what is meant by just, and sustainable, and explains the rationale in adopting these goals, which is based on the emerging findings from previous IPBES assessments, these being the Global and Regional Assessments of Biodiversity and Ecosystem Services and the Assessment of Pollinators, Pollination and Food Production, as well as other global assessments (such as GEO, the Global Land Outlook, World Water Development Report, the Global Wetlands Outlook and others) (IPBES, 2016a, 2018a, 2018b, 2018c, 2018d, 2019; Ramsar Convention on Wetlands, 2018; UNCCD, 2017; WWAP & UNESCO, 2019). All these documents highlight critical aspects relating to this context: the current global socio-economic system is eroding both certain social and institutional structures, and biophysical underpinnings (biodiversity and collectively ecosystems and their associated processes), at a variety of scales. IPBES assessments have also found that deep-rooted *transformative* change will be required to address the twin requirements of justice and sustainability in a timely manner. Furthermore, they highlight a role for values in transformation and that scenario planning or futuring processes can assist in surfacing multiple values, creating spaces for negotiating and assessing trade-offs and synergies to identify opportunities for transformation. Instrumental, relational and intrinsic values of nature are currently not effectively evaluated, considered and integrated into the varied and multiple decision-making contexts (both formal government process and informal, and from local to global scales) that shape both our environment and our collective future (Balvanera *et al.*, 2020; Harmáčková *et al.*, 2021; Pascual *et al.*, 2017; Vásquez-Fernández & Ahenakew pii tai poo taa, 2020; Zafra-Calvo *et al.*, 2020).

The chapter assesses the role of diverse values of nature in supporting socio-ecological transformations towards more just and sustainable futures. This is approached as a two-fold and mutually complementing task addressing the following key questions:

- What are the diverse values that have been considered in developing and creating visions for, and scenarios of the future, particularly those relating to more desirable futures – ones that are more just and sustainable?
- How have interventions to introduce more diverse values and valuation of nature been undertaken and how can these serve as leverage points for enabling transformation towards just and sustainable futures?

5.1.2 Unpacking the theoretical building blocks for the chapter

In this section, the importance of future visions and works is explained, as well as the need to better understand transformative change in order to contribute to a rapidly emerging social and environmental agenda focused on directing us towards more sustainable trajectories. Whilst one of the primary purposes of the chapter is to identify how diverse values can be mobilized for transformative change, it is likely that not all values can be equally accommodated if a kind of future that humanity can collectively desire is to be achieved. It is for this reason that linked concepts of justice and sustainability are introduced. Justice sits above the more contingent world of specific values, enabling us to establish parameters relating to the kind of values that humanity wants, in particular when striving for a common future based on principles of sustainability. As such justice and its links to sustainability are introduced and defined.

5.1.2.1 Why explore futures visions and works?

Painters, writers, dancers, designers, economists, musicians, politicians and people from all fields of study have engaged in thinking about, capturing, portraying, expressing and sharing their visions of the future. Studies of futures works provide us with a diverse collection of material that captures their thinking, preferences, beliefs, and fears for the inevitability that is the future. Generally, the goal of futurists and futures works, engaged in prospective thinking, are about making the world a better place to live (Bell, 1997). Futurists explore alternative futures, the possible, the probable and the preferable (Bell, 1997). Given the pace of global change and the interrelatedness of changes, people need to become more literate within this futures space (Masini, 2011).

Why engage in these issues within the context of this values assessment? Future visions such as scenarios have the potential to create spaces for discussion about what matters, and what would be the implications of not properly assessing nature and its contributions to the quality of human life. Establishing a vision for the future can be equated with establishing a target, or series of targets and goals to be achieved over a determined time horizon. This has three effects: Firstly, it establishes a values-based future state(s) or target(s) enabling us to transform from present. Secondly, it provides us with new potential directions and purposes, requiring us to focus actions and articulate policies for meeting these; these visions or scenarios thereby opening the possibility for more just and sustainable futures. Finally, it enables the building of constituencies for change (alliances, partnerships, social movements). Without these spaces for exchange and interrelation between actors and stakeholders, it is not feasible to achieve transformation towards just and sustainable futures.

Within this chapter interest is focused on understanding what the types of values are that underpin these different visions of the future. Given the nature of this assessment, the focus is primarily on written works, in particular published work explored in detail through formal review, the values associated with different future visions and scenarios, and how these lead to varying outcomes for nature, its contribution to people and a good quality of life. In this chapter, the focus is primarily on visions and scenarios within the environment and development space, and particularly those associated with sustainability and justice goals. Here the intention is to elucidate the values that underpin these visions, including how sustainability and justice are themselves conceived so that this learning can be integrated into driving transformative change towards more just and sustainable futures.

5.1.2.2 Justice and sustainability in creating a common future

At the 1972 Stockholm Conference, the Secretary-General of the United Nations Maurice F. Strong stressed the need for *'new concepts of sovereignty, based not on the surrender of national sovereignties but on better means of exercising them collectively, and with a greater sense of responsibility for the common good'* (United Nations, 1972, p. 45). Since then, the world community has repeatedly committed to visions of a *common* future (United Nations, 1987, 1992a, 1992b, 2015). Documents such as "Our common future" or "The future we want" can, in a first approximation, provide criteria for evaluating possible futures as desirable or undesirable. These visions reflect a shared concern for human development and the protection of the natural environment. They demand the integration of sustainability and justice into visions of a better future (i.e., a future that is more desirable than the one that is to be expected if business as usual were to be continued). In view of the global transformation of the planet through human activity in the Anthropocene, it has recently been suggested that biodiversity and the ecological and evolutionary processes it underpins should be considered the new "Global Commons in the Anthropocene" (Nakicenovic *et al.*, 2016).

This IPBES values assessment highlights the diverse values of nature and its contributions to people. Values are plural and subjective to varying degrees (Chapter 2). Specific values may vary from one culture to another as well as between individuals and groups (IPBES, 2015). Despite this variety of values, there is a clear need to facilitate collective action with regard to global commons. A shared understanding of which possible futures are

desirable and which are not is a necessary first step. Justice and sustainability have become core elements of such a shared understanding, as evidenced by their status within international commitments such as the SDGs. Justice and sustainability are broad and universally shared values. Whilst specific, concrete claims about what constitutes justice will always remain plural and contested (Miller, 2012; Sen, 2009; Smith, 1790), appeals to justice refer to generally accepted principles about what is owed to each other (Eser *et al.*, 2014; Mazouz, 2006). Justice is less contingent than specific values because you do not need to share the same value systems or preferences as others to agree, for example, that discrimination is wrong.

Sustainability is defined here according to the Millennium Ecosystem Assessment (MEA) definition, *'A characteristic or state whereby the needs of the present and local population can be met without compromising the ability of future generations or populations in other locations to meet their needs'* (MEA, 2005). This definition clearly refers to the way sustainable development was defined by the Brundtland Commission (United Nations, 1987) but is more explicit about the intra-generational aspects. This idea of sustainability is both evaluative and normative **(Box 5.1)**, incorporating the implicit value-judgement and normative claim that it is good (right) to meet the needs of the present and local populations and it is bad (wrong) to compromise the needs of the future and the geographically distant. Although sustainability can reasonably be interpreted as a boundary object with different meanings in different contexts (Star & Griesemer, 1989) it maintains its common identity across all contexts through the idea of justice within and between generations.

The principle of sustainability contains three objectives of justice: (a) justice between different people of the present generation (intra-generational justice), (b) justice between people of different generations (intergenerational justice), and (c) justice between humans and nature (ecological justice) (Baumgärtner & Quaas, 2010; Eser *et al.*, 2014; Stumpf *et al.*, 2015). These three objectives differ in their level of consensus. The moral rights of current humans are well established in the universal declaration of human rights. The rights of future generations are a contested issue in philosophy (Birnbacher & Thorseth, 2015; Düwell *et al.*, 2018) but consensus is now emerging that *'sustainability is about the future, our concern toward it and our acceptance of responsibility for our actions that affect future people'* (Norton, 2005, p. 304). In contrast, the rights of other-than-human entities remain controversial. Views related to this differ between diverse cultures, schools of thought and traditions. The IPBES conceptual framework recognises the importance of worldviews that do consider other-than-human entities as deserving of justice. This is reflected in the recognition of both intrinsic and relational values of nature, in addition to instrumental ones. This assessment, therefore, considers ecological as well as social justice (Annex 5.1).

5.1.2.3 Why transformative change

The terms "transformative" and "transformations" are increasingly used to denote the kind of deep-rooted change that is needed if humanity is to successfully navigate towards a safer and more desirable, or common future. At its broadest level, these terms indicate the need for game-changing shifts in society-nature relationships, rather than incremental change or change that is restricted to specific managerial practices (Patterson *et al.*, 2017). Folke *et al.*, (2010) state that transformative change involves profound shifts in *'perceptions and meaning, social network configurations, patterns of interactions among actors including leadership and political power relations, and associated organizational arrangements'.* The profoundness of required transformation is further emphasized when more concrete examples of *what* needs to be transformed are considered. For example, two things that are frequently stated as in need of transformation are (i) the pursuit of development goals based on the continuous increase in material consumption (Dryzek, 1997; Hickel & Kallis, 2020;

Box 5 1 **On evidence with regard to facts, values, and norms.**

1. **Factual statements** make claims about what's true or false. They can be supported or refuted by empirical evidence. Examples: *'Biodiversity is decreasing', 'A multiplicity of values exist that vary not only across cultures and contexts, but also across individuals'.*

2. **Evaluative statements** involve value-judgments that are beyond the scope of empirical sciences. They make claims about what's good or bad. The validity of these judgements cannot be derived from empirical evidence alone, but needs to be underpinned by (more or less) subjective values. Examples: *'The loss of biodiversity is bad', 'Taking into account the diversity and complexity of these diverse values is good'.*

3. **Normative statements** are prescriptive, i.e., they make claims about what actions are right or wrong. Like evaluative statements, they cannot be justified empirically, but need to be underpinned by intersubjectively acknowledged values. Examples: *'Biodiversity ought to be preserved', 'IPBES must integrate the values of different stakeholders'.*

IPBES, 2019); and (ii) the systematic production of social inequalities (Harvey, 2010; United Nations, 2017). This is a position that has been also reported by IPBES (2019) and this acknowledgement that transformation requires such fundamental societal changes brings it into the realm of political economy.

A distinction between "transformations" from "transitions" is considered through reference to the scope and nature of the kind of change under consideration. "Transitions" has mainly been used to refer to change to specific sub-systems, sometimes referred to as a sectoral or meso level focus (Hölscher *et al.*, 2018; Köhler *et al.*, 2019). For example, there are bodies of sustainability research that focus on transitions to the energy, mobility, food, water and forest sectors. By contrast, this chapter follows the precedent of defining transformations as emphasizing systemic changes that involve changes to society itself, including the redistribution of power in ways that benefit marginalised social groups and ensure that *'no one is left behind'* (Few *et al.*, 2017; Martin *et al.*, 2020; Patterson *et al.*, 2017; Scoones *et al.*, 2015). As the conducted review of published research reveals, there is increasing evidence that achieving this depth and breadth of change will have to involve interventions that work with values, including more plural forms of valuation.

This call for "transformative" change – the view that profound societal change is necessary to escape from the current nexus of environmental emergencies (biodiversity, climate, novel diseases) – has rapidly become accepted within United Nations science-policy assessments as well as wider government and non-government bodies. For example, the IPBES 2019 Global Assessment calls for transformative change that emphasizes addressing consumption and inequality as root causes of an unsustainable future. It lists effective interventions including: *'enabling visions of a good quality of life that do not entail ever-increasing material consumption'*, and *'addressing inequalities, especially regarding income and gender, which undermine the capacity for sustainability'.*

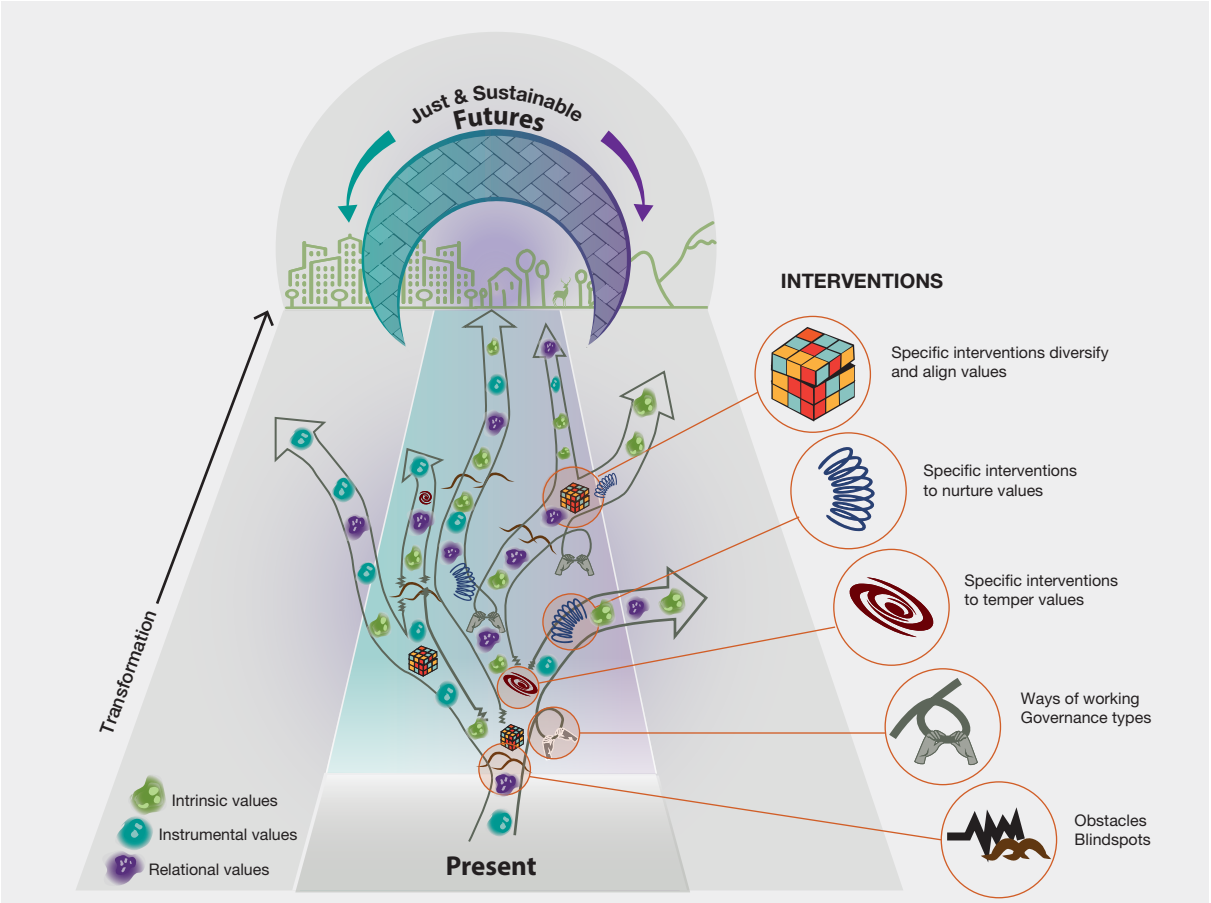


Figure 5 1 **Values underpinning transformative pathways to a just and sustainable future.**

The Global Assessment (IPBES, 2019) also identified the role of values of nature, proposing these could be *unleashed* in support of transformative change. A key part of the agenda here is to look deeper into this possibility – to progress the understanding of how the recognition and incorporation of more diverse values of nature can be a game-changing process; and to identify the political-economic challenges involved in seeking to govern such mobilization of diverse values. This is likely to involve transformations to governance itself. In an increasingly telecoupled world, the complex networks of connectivity pose challenges to governance solutions that are scale or sector-specific (Boillat *et al.*, 2018; Carrasco *et al.*, 2017). In global conservation governance, there is increasing recognition and emphasis on conservation action along ecological networks, transitioning away from a model of conservation based on area-based, high-value sites and landscapes. Justice framings of governance can bring to the fore the power dimensions in tele coupling, and elucidate causes of inequity in conservation (Boillat *et al.*, 2018). Recent governance analysis for addressing the continued loss of freshwater biodiversity has called for joined-up solutions at various levels. These include international agreements stimulating effective policy and management interventions, and the national and local state and nonstate actors playing central roles in defining context-specific portfolios of measures that address synergistic threats to freshwater biodiversity (Tickner *et al.*, 2020). Such governance challenges call for careful analysis of values underpinning institutional interactions, and indicate possible response options for enhancing "institutional and governance fit" along transformation pathways.

Justice and sustainability are qualities of a desirable future (section 5.1.2.2). Which values (of nature) individuals and society focus on shapes the pathways to the future **(Figure 5.1)**; only certain combinations of values, i.e., those that are balanced, are aligned with paths to a desirable future (section 5.2). Thus, defining and creating pathways to a just and sustainable future requires recognising and balancing these diverse values so that marginalised values can emerge or be acknowledged (e.g., relational values held by marginalised groups such as indigenous communities). Those values that are aligned with just and sustainable futures may need to be nurtured and enabled, while those that are not, or which have become too dominant, may need to be tempered or shifted (section 5.3). Institutional design and governance can facilitate these interventions by helping to overcome obstacles and enable those values that favour transformations towards more just and sustainable futures, and guide individual and collective action (section 5.4).

5.1.3 Outline of the chapter

The section explores in detail, if and how, having a clearer and more nuanced understanding of the multiple and various values people hold for nature, and the contributions nature provides to people, can facilitate, and possibly enable transformative change towards more just and sustainable futures. In this way, this chapter builds on the work of previous chapters: from Chapter 2, focused on current understanding of what kinds of values exist, Chapter 3 how can these values be measured, and how they are reflected in current decision-making in Chapter 4. This chapter analyses to what extent diverse values, together with more plural approaches to valuation, are reflected and expressed in futures work (such as scenarios and visions of the future – identified from multiple and varied sources), what range and types of values and valuation are most strongly associated with both process towards, and outcomes of, preferred futures, what role an extended range of recognised values can play in shaping pathways towards just and sustainable futures, and what are the leverage points for advancing and governing such pathways of transformative change.

The Chapter 5 assessment work has been organized into four sections, each addressing different aspects of the issues outlined above. Section 5.2 asks what and whose values have been considered in developing and creating visions for, and scenarios of the future, particularly those relating to more just and sustainable futures? This question is addressed from multiple perspectives, using a systematic review, scrutinising visions of the future in scientific scenarios as well as in other kinds of literature and in creative arts media. The review focuses on identifying the roles that different kinds of values (and valuation) play in these visions, both as part of the process towards envisioned futures and as outcomes (as changed (sets of) values). In doing so the chapter draws on the normative framing (above) that specifies justice and sustainability as qualities of better futures. The different values of nature present in visions are explored but also the conceptualisation/use of justice and sustainability as claims to common futures and agendas. The main output of this section is a general understanding of how values are considered within future visions (and as part of the pathways towards these), and the identification of what values – and what ways of handling diverse values – are strongly associated with preferred (just and sustainable) futures and preferred pathways towards these. Archetypical futures and archetypal values grouping are used in linking values to different futures.

Section 5.3 addresses the issue of how more diverse values and valuation of nature can be mobilized for enabling transformative change towards just and sustainable futures. It employs qualitative content analysis of literature on individual and societal level transitions/

transformations towards pro-environmental behaviour and sustainability. This produces findings about the role of values in emerging theories and frameworks of transformative change, about ways of intervening to enable individually held values to translate into pro-environmental behaviour, and about approaches to environmental knowledge production and decision-making that mobilize diverse values in ways that enrich understanding, empower groups of actors and facilitate reflexive learning. The bridge between individual and social mobilizations of values is also considered, especially through social norms that are seen to be a condition that enables or constrains the value-action chain.

In light of the leverage points, opportunities and challenges for mobilizing diverse values towards transformative change, Section 5.4 explores the kind of governance that can support this process. It employs expert literature review to assess the enabling role of governance, with a specific focus on governing transformations and the related needs of interagency coordination, working across scales, knowledge systems and capacities. The decision-making typology and framework for the values assessment is mapped onto governance forms and issues, to unpack the role of diverse values and plural valuations in explaining the degree of fit of a governance mode in enabling more just and sustainable futures (using depth, breadth and pathways as the frames of enquiry). The consequences of tele coupling are also examined from the lens of institutional and governance interplay, specifically unpacking the role of diverse values and plural valuations. In this way the chapter connects to Chapter 6 which explores stakeholder capacity needs in advancing these concepts.

Finally, in Section 5.5 the experience of the "real world" complexity of working with values is explored, learning from how different coalitions of scholars, practitioners and citizens address the challenges and opportunities for transformative change across system scales. This involves a focus on four selected pathways of current transformation – the green economy, degrowth, earth stewardship and nature protection. Exploring these pathways develops an understanding of the political economy of conceiving and governing pathways of transformative change: the existence of plural pathways towards preferred futures; the contested nature of these alternative pathways; and the role of power and vested interests in resisting change.

5.2 VALUES OF NATURE AND NATURE'S CONTRIBUTIONS TO PEOPLE, FOUND IN JUST AND SUSTAINABLE FUTURES

This section identifies what types of values underpin described futures, and what the futures outline in terms of impacts on nature, nature´s contributions to people and good quality of life. There are different approaches that have been developed and applied in defining aspects of the future, or developing futures works. These straddle all academic fields within both the sciences and arts, for example, forecasting, modelling, developing works of art and fictional writing. Each of these products or outputs have their own niche and audience and are either very specific or generic and speaking to either a short or long-term timeframe. Futures works are therefore seen to incorporate any form of evidence, including peer-reviewed or grey literature, arts-based or material from indigenous and local knowledge that is future-orientated including future visions and scenarios.

Future visions include different articulations of the future surfacing in peer-reviewed literature, policies, institutional documents (e.g., corporate/non-governmental organizations visions), arts-based practices and visions of the future in indigenous and local knowledge.

Scenarios, and scenario development **(Box 5.2)** is a futures output that has been applied to many different fields becoming a mainstream activity following the 1972 Meadows publication, Limits to Growth (Meadows *et al.*, 1972; Pesonen *et al.*, 2000). Scenario development has now been extensively used in the science-policy development space (IPBES, 2016b), in helping to address issues of uncertainty and complexity (Ash *et al.*, 2010). Scenarios are representations of different possible futures from a defined starting point (IPBES, 2016b; Mahmoud *et al.*, 2009). They are focused on highlighting or exploring drivers of change and the impacts of changes in these over a specified time frame. In doing so they enable decision-makers to anticipate potential changes and develop timely responses to these (Mahmoud *et al.*, 2009). Scenario development has emerged as an important tool for exploring complex issues within science policy stakeholder dialogues. Within the science-policy development arena, three types of scenarios have been defined and developed (IPBES, 2016b): Exploratory scenarios (the most common), that examine plausible different futures based on select direct or indirect drivers, are often based on storylines or narratives and are used in agenda setting; 2) intervention or policy scenarios that consider alternative management approaches of policies around specific actions (this scenario type can be divided into two groups, those scenarios that are target seeking or normative describe agreed-upon desirable

Box 5 2 Approach to planning or co-developing scenarios.

Multiple studies have defined approaches to planning or developing scenarios, with many of these having very similar core features and design stages. The approaches proposed by Alcamo *et al.* (2005); Bishop *et al.* (2007); Bradfield (2008); Dong *et al.* (2013); Henrichs *et al.* (2010); IPBES (2016b); Kok (2009); Kok *et al.* (2011); Mahmoud *et al.* (2009); Pesonen *et al.* (2000) and Reed *et al.* (2013), were synthesized to develop a generalized approach for scenario development. This approach consists of 5 distinct stages outlined below.

1. **Establishing the scope:** Constitute a scenario development group or team that identifies the focus and objectives, core region or area of interest, time horizons and boundaries (biophysical, socio-economic, and political) within the exercise;

2. **Stakeholder roles:** Identify the stakeholders included in the process and select appropriate participatory techniques. Participatory methods (such as workshops, discussion forums and meetings) allow stakeholders (including scientists, policymakers, citizens and local and indigenous communities) to be directly involved in defining complex problems, and assessing and evaluating different futures (IPBES, 2016b; Kok *et al.*, 2011). Participation here allows for the emergence of issues, broader inclusion of different perspectives and worldviews and a more holistic suite of values that people place on nature (IPBES, 2016b). Expert-based approaches are a specific form of participatory method, where practitioners in select fields are invited to provide input into scenario construction processes (IPBES, 2016b) based on their knowledge. The degree to which stakeholders are engaged in the process, ranging from a supportive role to leading the design, influences the scenario team's role, which in turn can shift from leading to supporting (Henrichs *et al.*, 2010);

3. **Determine baselines and indicators:** Understand the current baselines of the socio-ecological system. Identify key measurements and potential direct drivers of change (e.g., land-use change, climate change, pollution, natural resource use and exploitation, invasive species) and the indirect drivers of change (economic, demographic, socio-cultural, governance and institutions, technology). Establish an understanding of causal relationships within the socio-ecological systems and between drivers using expert knowledge, modelling, literature and stakeholder engagement;

4. **Explore and assess trajectories:** Identify likely future developments, a full range of potential future trajectories and likely changes (particularly for biodiversity and ecosystem services) and highlight key uncertainties and assumptions. Assess the relative strength of each of the drivers and focus preliminary scenario development on these relative strengths. If required, select axes based on stressors on which to develop preliminary scenarios. Clarify desired policy end-points of each of the developed scenarios;

5. **Articulate scenarios:** Draft the final scenarios, following an appropriate review process involving stakeholders. The end products benefit from being fit for purpose, both in terms of content and format.

futures, and may include alternative pathways for reaching these targets though decisions and actions; and those that are policy screening); and 3) policy review scenarios (or retrospective policy evaluation scenarios) that evaluate past policy efforts so as to understand successes and failures against intended impacts (IPBES, 2016b). The first two approaches are most commonly developed and used.

The guiding questions of this section are:

- *What types of values of nature underpin different future scenarios and visions* (particularly those visions that include dimensions of justice and sustainability), leading to *what kind of outcomes for nature, nature's contributions to people and a good quality of life?*
- Are *different types* of values of nature (e.g., instrumental, relational) and their dynamics (e.g., singular / plural, level of diversity, dominance of one / balance), associated with *particular types of futures* (e.g., undesirable / desirable, unsustainable / sustainable, unjust / just)?
- Can the incorporation of plural *(versus unique) values in decision-making* be detected with regard to *just and sustainable futures?*

5.2.1 Scope and methodology for assessing futures works and their inclusion of values

In assessing what types of values underpin different types of futures (including future impacts on nature, nature´s contributions to people and good quality of life), and how these relate to just and sustainable futures, various types of futures works were reviewed, including exploratory scenarios and target-seeking (normative) scenarios.

Multiple data sources were assessed based on a guiding review framework[4], specifically:

4. Systematic review of association between values of nature, nature´s contributions to people and good quality of life and futures in scenarios, visions and pathways (https://doi.org/10.5281/zenodo.4359655).

1. Peer-reviewed literature,

2. Grey literature (policy and planning documents, reports originating from science-policy processes, business, international organizations, non-governmental organizations, etc.),

3. Arts-based materials,

4. Materials based on indigenous and local knowledge.

Complementary review approaches included:

A systematic keyword-based search of peer-reviewed and grey literature supplemented with:

   a. Snowball-sampling and a refined keyword-based search to fill gaps identified in the systematic keyword-based searches (particularly regarding grey literature, ILK based materials and arts-related materials), and

   b. Incorporation of review results from the previous IPBES assessments (particularly Chapter 4 and 5 of the Global Assessment, and Chapter 5 of the Europe and Central Asia Regional Assessment, which carried out targeted reviews of future exploratory and target-seeking scenarios, including pathways).

In total, 460 future scenarios were systematically assessed and synthesised from 159 peer-reviewed studies and grey literature reports[5], including 342 peer-reviewed scenarios and 118 scenarios from grey literature. In addition, evidence from snowballed-sampled arts-based and ILK based materials was included.

The review and synthesis took into account only futures works which addressed impacts on all three components of IPBES Conceptual Framework – nature, nature´s contributions to people and good quality of life, while elaborating on values at the same time. This criterion eliminated a vast majority of existing futures works.

Futures works, identified through the searches for peer-reviewed literature, grey literature and ILK literature were entered into databases and coded. Several lenses and filters were applied in analysing the developed databases and coded information, based on selected operational approaches and thematic issues presented in Chapter 1 (justice), Chapter 2 (types of values) and Chapter 3 (types of valuation approaches). In eliciting and making sense of the values captured in reviewed databases, the review builds on (1) the work developed in Chapter 2 thereby ensuring consistency with the typology of values presented, (2) the IPBES Preliminary Guide on Values (IPBES, 2015), and (3) additional typologies of values (Díaz *et al.*, 2015; IPBES, 2020). In addition, the review draws on the valuation approaches and methods presented in Chapter 3.

In each of the identified future scenarios or visions of the future, it was distinguished which types of values underpin these different futures (these values were expressed both implicitly and explicitly) and which values are expressed/articulated as the outcomes of the futures (e.g., through monetary or biophysical valuation). The assessment results presented in the following sections, are based on quantitative and qualitative analyses of data from these databases.

5.2.2 Values underpinning different types of futures

5.2.2.1 Incorporation of values in futures works – key influencing factors

a) Geographic coverage and scales

The identified and reviewed futures works originated primarily from local-scale studies (44.3%), followed by the national scale (16.7%) **(Figure 5.2 (I))**. The scale of the futures works did not appear to determine whether they explicitly engaged with underpinning values: underpinning values were addressed explicitly in 26% of global futures works, 13% of regional (continental), 16.7% of national and 44.3% of local futures works. In terms of IPBES regions, 26% of the studies focused on futures of Asia-Pacific, followed by Europe and Central Asia and the Americas (**Figure 5.2 (II)** and **(III)**). Only 7% of the futures focused on Africa. Whilst there is strong disparity across regions in terms of focus on futures, there was however, no obvious pattern between the geographic region of futures' and the focus or justification of values underpinning them.

b) Scenario development approaches, focus and stakeholder engagement

The vast majority of futures works were initiated within research and academic contexts **(Figure 5.3 (I))**; only 25% of futures works, developed by academia, had no stakeholder engagement. On the contrary, 55% of futures works originating from academia were participatory or policy-driven. The vast majority of futures works were developed as exploratory scenarios, uncovering a variety of pathways of potential future development **(Figure 5.3 (II))**.

The reviewed futures incorporated both qualitative and quantitative studies (ranging from narrative analysis to

5. Systematic review of association between values of nature, nature´s contributions to people and good quality of life and futures in scenarios, visions and pathways (https://doi.org/10.5281/zenodo.4359655).

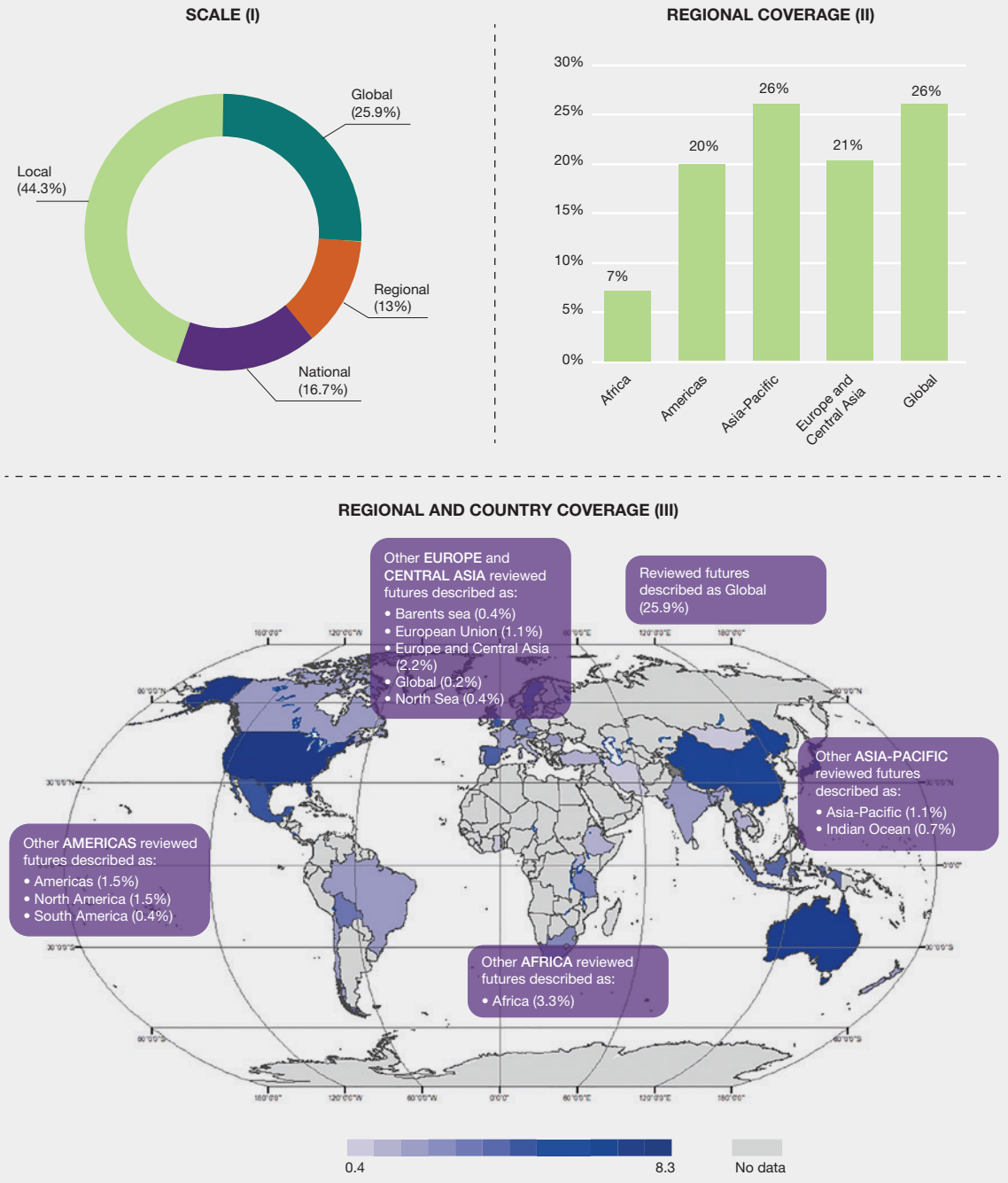


Figure 5 2 **Selected descriptive characteristics of the 460 reviewed futures works** (future exploratory scenarios, target-seeking scenarios/normative visions and pathways as sequences of decisions and actions leading to future goals).

modelling). The majority of the reviewed futures studies were outlined in quantitative terms **(Figure 5.3 (III))**. Overall, there were more quantitative studies identified (45%) than qualitative studies (23%). However, of the qualitative studies identified, 74% addressed values explicitly, in contrast with the quantitative studies where 45% of these explicitly considered values. Most frequently, quantitative studies assessed biophysical and economic values (31% of quantitative studies), followed by standalone biophysical and economic valuation (22% and 14% of quantitative studies, respectively). Other types of values tended to be assessed qualitatively, e.g., through participatory approaches (49% of qualitative studies and 16% of mixed-methods studies focused on the elicitation

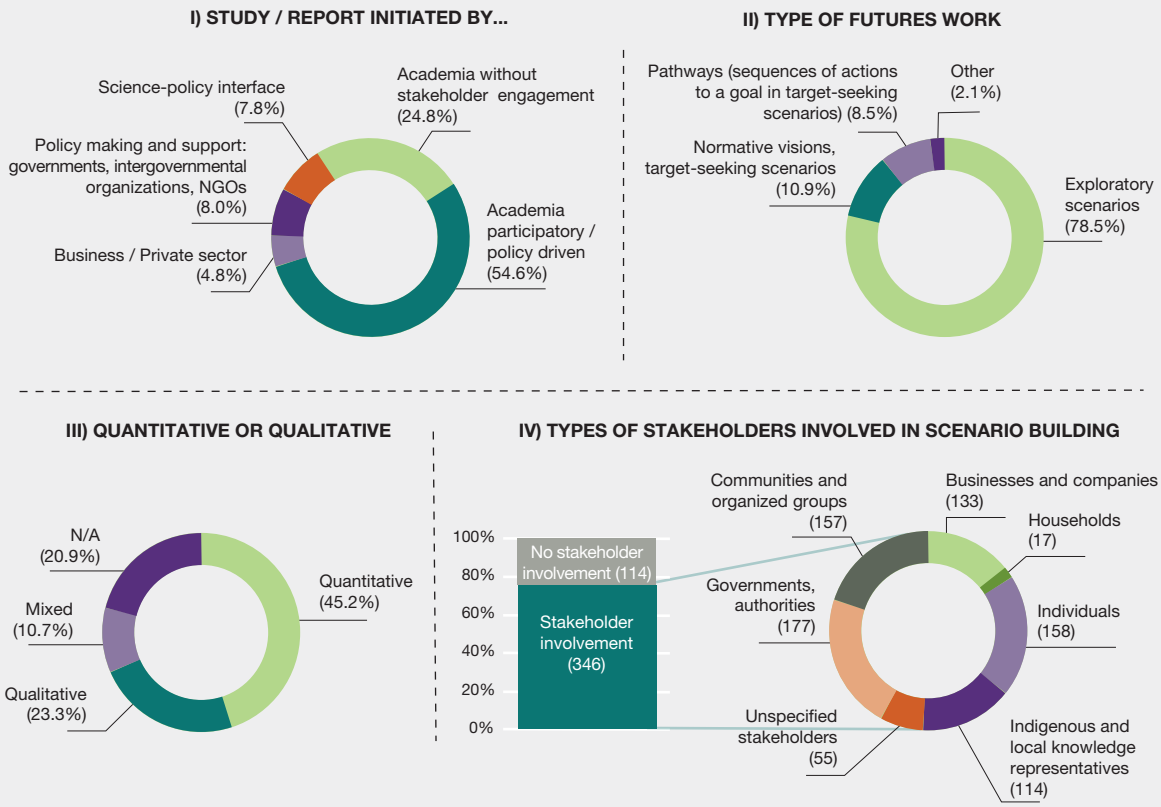


Figure 5 3 **Selected descriptive characteristics of the 460 reviewed futures work**, (I) highlights who initiated the study, (II) types of futures work – future exploratory scenarios, target-seeking scenarios/normative visions and pathways as sequences of decisions and actions leading to future goals, (III) nature of the study – qualitative or quantitative, (IV) types of stakeholders involved in each study (values in the right side pie chart are not mutually exclusive, multiple types of stakeholders were included in most studies).

of socio-cultural values or holistic, indigenous and local valuation).

Stakeholders were involved in the development of about 75% of futures works, mostly including various individual stakeholders, communities and organized groups, governments and authorities at different decision scales, and businesses **(Figure 5.3 (IV))**. No relationship was evident between the variety of stakeholders involved in the development of the futures and the depth to which values were addressed in them. The intention of the leaders of the futures development to explicitly include values in the scenario-building process and final products appears to have had more influence than stakeholder involvement *per se*.

In terms of recognising different knowledge holders (which were considered to be linked to notions of recognitional justice), holders of indigenous and local knowledge (ILK) were involved in the development of 114 out of 460 futures. Of the 102 peer-reviewed scenarios that included ILK, the majority of studies (n=45; 57%) were aligned with value combinations that were balanced with a dominant societal focus, followed by those that were moderately individualistic and materialistic (n=26; 35%), with only 8 studies being linked to deeply individualistic and materialistic value combinations (10%).

c) Engagement with policy instruments

The vast majority of futures works were not concerned with policy instruments or did not make this an explicit **(Table 5.1)**. Future works that did include a policy component tended to focus on Legal and regulatory issues and to a lesser degree on economic and financial issues. Rights based and customary issues, and social and cultural issues received negligible attention.

Table 5 1 **Proportions of assessed futures works including different types of policy instruments.**

The colour coding on a blue-white-red scale is used to highlight the most common (blue) and least common (orange) policy instruments and their combinations.

	Legal and regulatory	Rights-based and customary	Economic and financial	Social and cultural	No policy instruments specified
Legal and regulatory instruments	29%	3%	8%	4%	
Rights-based instruments and customary norms		4%	2%	2%	
Economic and financial instruments			13%	3%	
Social and cultural instruments				8%	
No policy instruments specified					62%

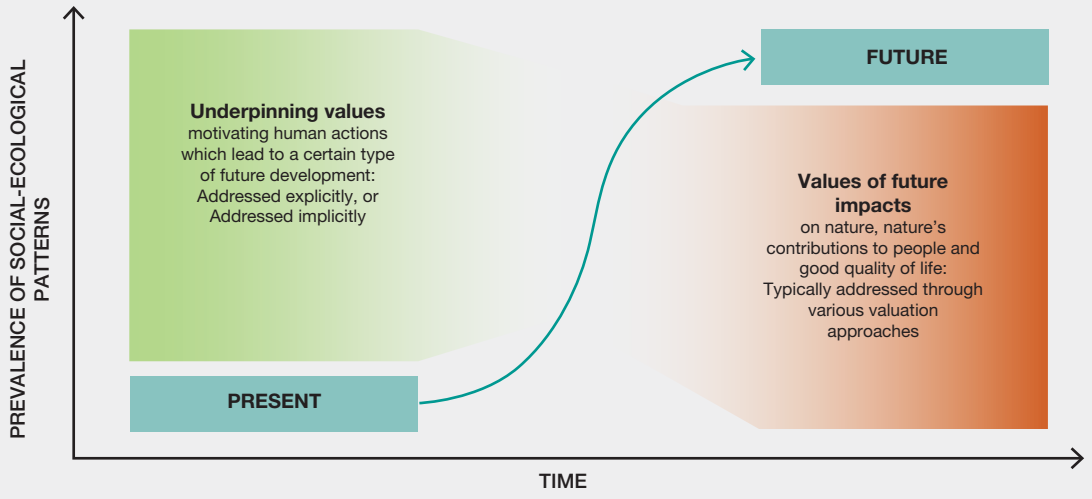


Figure 5 4 **Schematic illustration of two different ways that values were approached (from the present and future perspective) in the assessed futures works.**

5.2.2.2 Types of values addressed in futures works

This analysis set out to establish which values have been addressed (or missed/neglected) in the established visions of the future related to nature, nature´s contributions to people, and good quality of life. Additionally, it determined the degree to which multiple/diverse values have been captured, and if particular values have tended to be overlooked.

The futures works assessed in this chapter have (a) focused on values underpinning human actions while expressing/articulating them either explicitly or implicitly (by mentioning the values aspect of futures thinking but not assessing underpinning values in detail), or (b) performed a certain type of valuation of potential future impacts on nature, nature´s contributions to people or good quality of life without explicitly addressing the role of values in underpinning human actions shaping future development **(Figure 5.4)**.

Figure 5 5 **Selected descriptive characteristics of the 460 reviewed futures works** (future exploratory scenarios, target-seeking scenarios/normative visions and pathways as sequences of decisions and actions leading to future goals).

The assessment shows that there is a continuum of the extent to which values are explicitly recognised as a driving force of the future. Out of a total of 460 futures works, 247 explicitly reflected on the values underpinning certain types of future development **(Figure 5.5 (I))**. With the same degree of frequency, the assessed futures works included a valuation of the futures impacts (e.g., resulting future economic, biophysical or socio-cultural values).

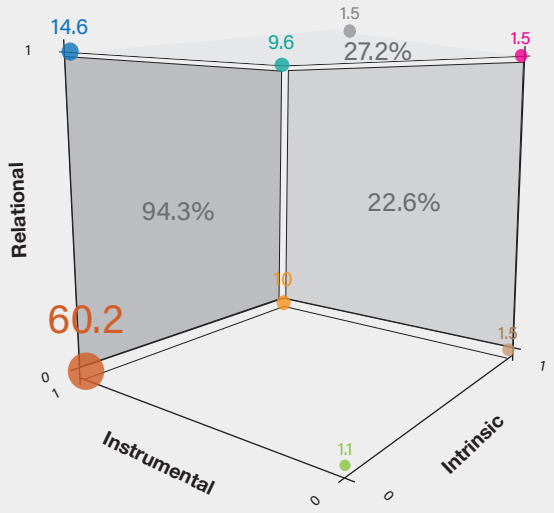
The most common approach to value potential future impacts on nature, nature´s contributions to people and good quality of life was biophysical modelling, economic evaluation and socio-cultural assessment (e.g., participatory assessment) **(Figure 5.5 (II))**. These approaches were combined in (33%) of the assessed futures to gain a more holistic perspective. Futures rarely incorporate valuation of impacts on human health (eight futures out of 460) and holistic, ILK based valuation (two futures out of 460).

"Value" in the reviewed studies mostly represented a preference (for something or for a particular state of the world) or a measure (e.g., monetary value, biophysical value such as the number of species). Only in the minority of cases did "value" refer to a principle or a core belief **(Figure 5.5 (III))**.

Most futures were underpinned by multiple value foci, i.e., study participants valued multiple aspects of nature, nature´s contributions to people and good quality of life at the same time (91%). Values for nature (e.g., individual organisms, biophysical assemblages, biophysical processes and biodiversity) underpinned approximately 32% of the futures, while the rest did not account for this focus of values. Values for nature´s contributions to people underpinned the majority of future visions, in 86% of the futures focusing on material nature´s contributions to people. As for values for aspects of good quality of life related to nature, these underpinned most futures, with a 68% focus on individual quality of life, e.g., individual well-being, learning or security. 54% of the futures focused on societal aspects of good quality of life, and only 26% on cultural aspects.

Almost all futures were driven by instrumental values for nature (94%), either solely (60%) or in combination with other value justifications (34%). Only a minority of futures were underpinned by intrinsic (22%) and relational (27%) values for nature, most often in combination with instrumental values. Only 1.5% of futures were solely focussed on intrinsic values, and only 1.5% solely by relational values. Most common interaction was between instrumental and relational values (in 15% of the futures) **(Figure 5.6)**.

In terms of the life value frames – "living from nature" (or considering nature as a resource) and "living with



VALUE JUSTIFICATION	% OF ASSESSED FUTURES WORKS
All value justifications	9.6%
Solely instrumental	60.2%
Instrumental + intrinsic	10.0%
Instrumental + relational	14.6%
Solely intrinsic	1.5%
Intrinsic + relational	1.5%
Solely relational	1.5%
No value justification included	1.1%
Total	**100.0%**

Figure 5 6 **Proportion of assessed futures underpinned by different value justifications** (i.e., instrumental, intrinsic and relational values; see Chapter 2 for a full definition).

nature" (or considering nature as "the other", e.g., through conservation) were the value frames most commonly underpinning potential futures (with respectively 94% and 36% of futures scenarios and visions), followed by "living in nature" (considering nature as surroundings people relate to, e.g., through place attachment or cultural landscapes; 26%) and only in (3%) of the cases "living as nature" (considering no distinction between humans and nature)[6].

5.2.2.3 Future outcomes, archetypal futures and underpinning value types

The future is likely to unfold within the wide range of possibilities and trajectories that futures studies present. Whilst this is recognised, it is useful to try to distil and simplify this range of future trajectories down to a smaller number of possible futures in understanding and assessing the potential implications of different trajectories or future pathways.

The chapter draws on *seven broad types of potential future development* identified as "scenario archetypes" as developed and discussed by Hunt *et al.* (2012) and van Vuuren *et al.* (2012), which have been widely used across IPBES assessments (IPBES, 2016b; Sitas *et al.*, 2019): (1) Business as Usual, (2) Economic optimism, (3) Global sustainable development, (4) Regional sustainability, (5) Regional competition, (6) Inequality and (7) Breakdown (**Box 5.3**, **Table 5.2**, **Figure 5.7**).

These scenario archetypes are used as a synthesis tool applied to the reviewed futures works describing potential future developments and their relation to underpinning values (based on n=460 scenarios from peer-reviewed studies and grey literature)[7].

The assessment presented here illustrates how different archetypal futures are underpinned by different combinations of value types; specifically, three key types of value combinations or foci have been identified: (A) deeply individualistic and materialistic, (B) moderately individualistic and materialistic (or low societal / business as usual), and (C) balanced with dominant societal focus (or collectivism/ equity / justice) **(Figure 5.7)**.

The following subsections summarise the types of futures that can potentially occur or future archetypes, and which combinations of values seem to underpin these future developments (archetypal combinations of value types).

5.2.2.3.1 Archetypal futures

Future trends in nature, nature´s contributions to people and good quality of life from multiple types of future scenarios, visions, policy documents, reviewed in this assessment have been summarised based on the overall "archetypal" future

6. It should be noted that **none** of the futures works explicitly used the Life Frames of Nature's Values or the Nature Futures Framework. These frameworks were applied only *ex post* as a lens to assess the futures works during expert (yet subjective) interpretation, conducted to keep coherence with other Chapters as well as other IPBES assessments and processes. Thus, these results need to be interpreted with caution.

7. Differences between future archetypes – (text similarity analysis) (https://doi.org/10.5281/zenodo.4380980).

Box 5 3 Making sense of recurring patterns in scenario studies – scenario archetypes and archetypal futures.

Scenario archetypes have been defined as being overarching, global, macroscopic images of alternative future states of the world (Fergnani & Jackson, 2019). Archetype approaches used to develop an understanding of recurrent patterns, drivers and processes in socio-ecological systems and from these form explicit generalisations based on contextual and normative conditions (Hunt *et al.*, 2012; Oberlack *et al.*, 2019; Sietz *et al.*, 2019). Archetype approaches are extremely useful within scenario analysis, particularly those linked to science policy processes, enabling the distillation of scenarios into core or overarching archetypes, from large amounts of unstructured textual data, thus enabling comparison between diverse collections of scenario studies (Sitas *et al.*, 2019). Here typically scenario studies are designated as aligning or falling into a specified scenario archetype by a panel of experts and reviewers. Fergnani & Jackson (2019) have even gone so far as to suggest four predetermined generic archetypes: continued growth, collapse, discipline, and transformation. While the scenario archetype approach in general allows for the synthesis of large amounts of diverse information they have been criticised as being subjective and simplistic (Sitas *et al.*, 2019).

Table 5 2 Overview of the original set of global archetypes and their underlying assumptions that were used as a starting point to classify scenarios within the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES) regional assessments.

The first column contains attributes typically used to describe scenario archetypes. Economic optimism scenarios focus on competition, efficient market, and economic growth; reformed market scenarios are similar to economic optimism but corrected for market failures; global sustainable development scenarios focus on environmental protection and reduction of inequality through global cooperation, lifestyle change using efficient technologies; regional sustainability scenarios highlight globalization and international markets that are seen to erode traditional values and social norms; regional competition scenarios feature regional self-reliance, national sovereignty and regional identity but also involve tensions with other regions; and finally business-as-usual scenarios that assume continuation of historical trends (IPBES, 2016b; van Vuuren *et al.,* 2012). These were rationalized in the IPBES regional assessments (IPBES, 2018a, 2018b, 2018c, 2018d) (from Sitas *et al.*, 2019).

ATTRIBUTE	SCENARIO ARCHETYPE					
	Economic optimism	Reformed markets	Global sustainable development	Regional sustainability	Regional competition	Business-as-usual
Economic development	Very rapid	Rapid	Ranging from slow to rapid	Medium	Slow	Medium
Population growth	Low	Low	Low	Medium	High	Medium
Technology development	Rapid	Rapid	Ranging from medium to rapid	Medium to rapid	Slow	Medium
Environmental technology development	Rapid	Rapid	Rapid	Ranging from slow to rapid	Slow	Medium
Main objectives	Economic growth	Various goals	Global sustainability	Local sustainability	Security	Not defined
Environmental protection	Reactive	Both reactive and proactive	Proactive	Proactive	Reactive	Both reactive and proactive
Trade	Globalization	Globalization	Globalization	Trade barriers	Trade barriers	Weak globalization
Policies and institutions	Policies create open markets	Policies targeted at market failures	Strong global governance	Local actors	Strong national governments	Mixed
Vulnerability to climate change	Medium-high	Low	Low	Possibly low	Mixed	Medium

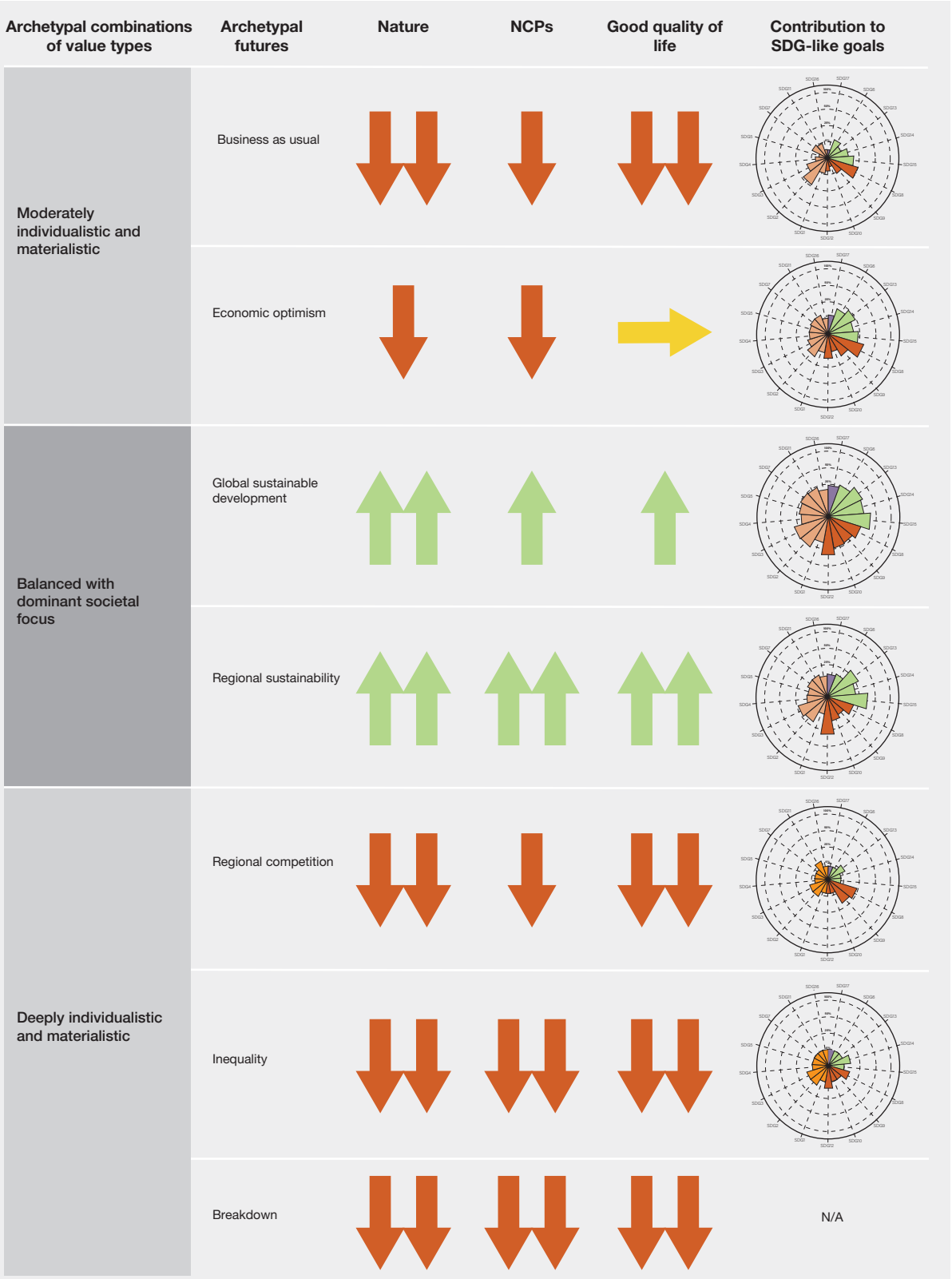


Figure 5 7 **Different future archetypes, grouped by key combinations of values, in relation to sustainable state of nature, nature's contributions to people, a good quality of life and contribution to SDGs.**

Red = widespread failure in the achievement of policy targets; green = widespread achievement of targets; yellow = mixed achievement of targets. For detailed information on the contribution to SDG-like goals see Figure 5.9.

they describe[8]. While **Table 5.2** and **Figure 5.7** summarise the typical dynamics of each future archetype, and the outcomes for nature, nature´s contributions to people and good quality of life such futures might lead to, the next subsections summarise to what extent the archetypal futures are sustainable and just.

The vast majority of the reviewed futures belonged to Regional sustainability (28%), Global sustainable development (25%), Economic optimism (20%), and the Business-as-Usual archetype (12% of futures), which provided enough material for their robust description and summary **(Figure 5.8)**. However, descriptions of futures are scarcer for the Regional competition archetype (5% of futures), Inequality (3%) and Breakdown (2%); their summaries are therefore based on limited evidence.

Almost half of the futures that included ILK were found to be aligned with the regional sustainability archetypes (n=51; 45%), followed by global sustainable development (n=20; 18%), economic optimism (n=17;15%) business as usual (n=13; 11%) with regional competition, inequality and breakdown archetypes each only represented by a handful of studies (5 (4%), 3 (3%) and 2 (2%) respectively).

Sustainability in archetypal futures

The archetypes differ vastly in the degree to which they contribute to fulfilling sustainability goals, e.g., the 2030 Agenda for Sustainable Development (SDGs; United Nations, 2015). While only a minor proportion of the future scenarios and visions covered SDGs explicitly (72 out of 460 futures), most of them addressed goals that could be linked to specific SDGs at least implicitly (257 out of 460 futures). Only the proportion of the 460 reviewed future scenarios and visions that led to reaching goals equivalent or similar to different SDGs was assessed.

The most SDG-like goals can be reached under futures from the Global sustainable development and Regional sustainability archetypes **(Figure 5.9)**. Should the future development follow the Business-as-Usual or the Economic optimism archetype, the most likely SDGs to be fulfilled are SDG 8 Decent Work and Economic Growth, followed by SDG 2 Zero Hunger and SDG 3 Good Health and Wellbeing. In addition, the Economic optimism archetype also seems to contribute to SDG 13 Climate action and SDG 15 Life on Land, in contrast to the Business-as-Usual archetype, under which the fulfilment of these goals is unlikely. The Regional competition and Inequality archetypes of future development show negligible level of contributing to SDGs.

On the contrary, the Global Sustainable Development and Regional Sustainability archetypes show the highest potential for achieving SDGs, and also to contribute to multiple SDGs in parallel. In this respect, Global Sustainable Development shows even higher potential. High proportion of the futures under these two archetypes contribute to SDG 12 Responsible Consumption and Production (33% under Regional Sustainability and 34% under Global Sustainable Development), SDG 13 Climate Action (30% under Regional Sustainability and 37% under Global Sustainable Development), SDG 14 Life Below Water (34% under Global Sustainable Development) and SDG 15 Life on Land (41% under Regional Sustainability and 46% under Global Sustainable Development). In addition,

8. Differences between future archetypes – (text similarity analysis) (https://doi.org/10.5281/zenodo.4380980).

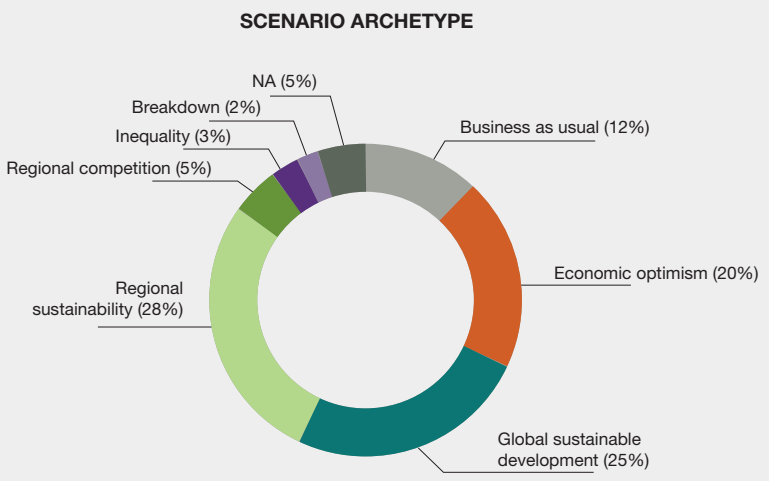


Figure 5 8 **Representation of different scenario archetypes among the reviewed futures [n=460].**

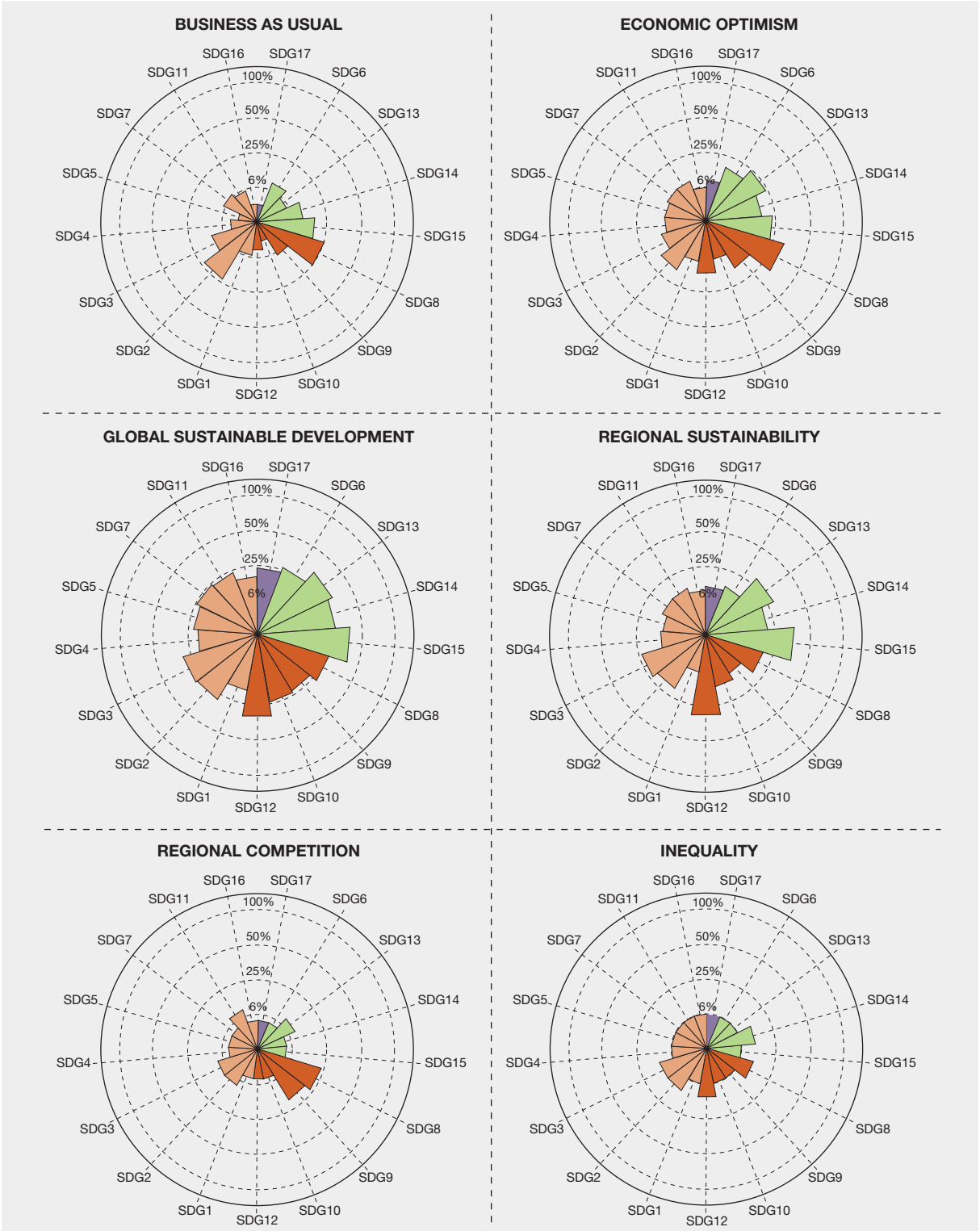


Figure 5 9 **Coverage of goals corresponding to the Sustainable Development Goals by future visions, scenarios and pathways (n=460), originating from the global to the local level.**

The bars are colour-coded based on their dominant character – economic (red), biophysical (green), social (yellow), global partnership (purple) (based on Folke *et al.*, 2016). The size of the bar towards each Sustainable Development Goal shows the proportion of futures targeting the respective goals (or their alikes), ranging from 0% (goal not targeted by any future scenario) to 100% (goal targeted by all future scenarios). Note the visions often concern a different timescale to the Sustainable Development Goals (longer-term, beyond 2030) (the Breakdown archetype has been omitted from the visualisation due to very scarce evidence).

these archetypes are strong in contributing to SDG 2 Zero Hunger, SDG 3 Good Health and Well-being, SDG 6 Clean Water and Sanitation and SDG 8 Decent Work and Economic Growth.

Dimensions of justice in future archetypes

Issues of justice were addressed to only a limited extent in the available scenarios. Our analysis showed that 27% scenarios (n=130) from peer-reviewed and grey literature, were coded to include dimensions of justice and equity. Of these studies, 38% (n=49) surfaced issues linked to (in) equity, with 32% (n=41) specifically referring to social or ecological justice. Ten percent of scenarios (n=13) mentioned the importance of fairness when considering outcomes, with another 10% (n=13) highlighting issues relating to inclusivity. Six studies (4% (n=5)) referred specifically to trade-offs between different actor groups in relation to justice dimensions, and only 6 studies (5%) explicitly mentioned a human rights-based approach as being central to more just outcomes, with two scenarios explicitly highlighting the importance of trust, and one scenario foregrounding dignity as an important consideration. The scenarios that included dimensions of justice or equity were mostly associated with the Global Sustainable Development archetype (32%, n=42) followed by Regional Sustainable Development archetypes (27%, n=35) and Economic Optimism (17%, n=22). Three scenarios had an explicit focus on indigenous rights and knowledge (Brown *et al.*, 2016; Meyer *et al.*, 2016; Outeiro *et al.*, 2015) which were all associated with positive gains for nature, nature´s contributions to people and good quality of life and were associated with the Regional sustainability archetype and balanced with dominant societal focus in terms of value combination.

Distributive justice

The issue of trade-offs between those who benefit and those who lose in different futures is largely understudied. Trade-offs were explicitly coded for in 188 (40%) of the scenarios, with the majority focusing on trade-offs between ecosystem services (n=48), followed by trade-offs between different land-uses (n=33) and ecosystem services / nature´s contributions to people and dimensions of human wellbeing / good quality of life (n= 26). This analysis showed that 18% (n=55) of the scenarios explicitly accounted for winners and losers. Eighteen scenarios were coded in ways that couldn't account for winners and losers, these were summarised as those where the *powerful* (in terms of economic, political or socio-cultural power) *win*, the *powerful lose* and those that are mutually *beneficial to both powerful and non-powerful* actors. Of these, it was found that the majority of scenarios where powerful actors won (n=9) were associated with increases in negative impacts on nature, nature´s contributions to people and good quality of life and only associated with instrumental values, with more deeply individualistic and materialistic value combinations, followed by moderately materialistic and individualistic and only one example where the values were more balanced with dominant societal focus.

Of the scenarios where non-powerful actors won (n=10), overall the impacts for nature, nature´s contributions to people and good quality of life were mostly positive, followed by medium impacts and only a few examples where nature, nature´s contributions to people and good quality of life were negatively impacted. In addition, these scenarios were associated with Regional Sustainability or Global Sustainable Development (with 1 Business-as-Usual) and showed a much more diverse spread of values where instrumental still dominated, but there were equal other measures of intrinsic and relational values associated mostly with more balanced with dominant societal focus.

5.2.2.3.2 Archetypal futures and value foci

This section defines the key value combinations underpinning different archetypal futures based on value focus, i.e., the level of priority given to existing IPBES conceptual framework, particularly nature, nature´s contributions to people and good quality of life **(Figure 5.10)**. It highlights inter-value relationships, commenting on values that are more or less compatible with others and identifying which values cluster together in directing future developments and development pathways.

1. Value combination A: Deeply individualistic and materialistic

This value combination (found in 10% of the futures) is characterised by a vast dominance of individualistic and materialistic values. People prefer individual aspects of wellbeing, focusing on their individual health and personal-wellbeing, education and relations. They are also particularly concerned about their own security and livelihoods. This is echoed by valuing primarily material nature's contributions to people for the provision of food, water, materials such as fibres and timber, and energy. These value foci are only very rarely complemented by other types of value foci (namely the value focus on regulating nature´s contributions to people).

2. Value combination B: Moderately individualistic and materialistic

This value combination is similar to the previous one in terms of the dominance of individualistic and materialistic value foci (in 32% of the futures). However, unlike in the previous case, these value foci are accompanied by others (although weaker), these being the value focus on nature, regulating and non-material nature's contributions and aspects of quality of life beyond the individual. As this combination of values is characteristic of Business-as-Usual futures, representing an extrapolation of current trends, this

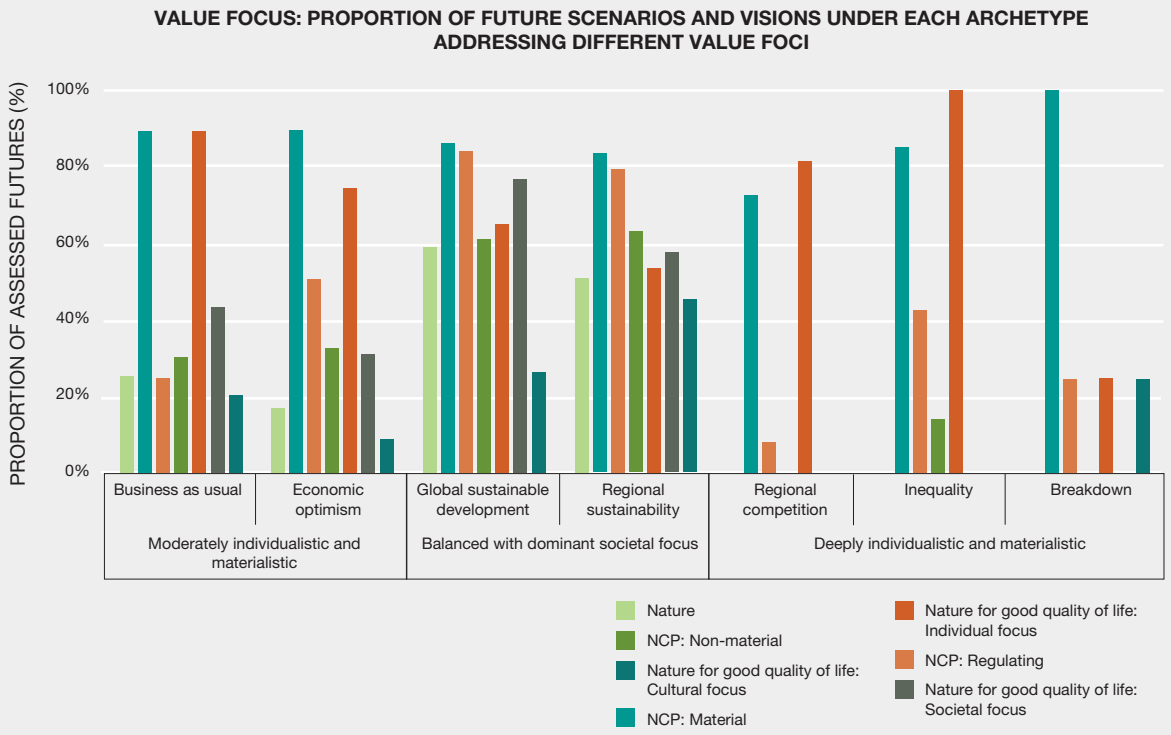


Figure 5 10 **Representation of different value foci across archetypal futures.**

Figure 5 11 **Representation of different value justifications across scenario archetypes.**

Instrumental values refer to values for substitutable means to a human end (e.g., water is used as a means to mitigate thirst, but it does not matter which particular water is used, it can be substituted for different water). Intrinsic values of nature refer to values of nature itself, without reference to humans. Relational values refer to non-substitutable relationships to nature (e.g., valuing a particular animal or tree that cannot be replaced by a different one). Please see Chapter 2 for a more nuanced explanation.

combination of values can be summarised as the one seen to dominate current global development patterns.

3. Value combination C: Balanced with dominant societal focus

The third key combination of values is rather different from the previous two (found in 53% of the futures). Most importantly, among the value foci that people appreciate the most in terms of good quality of life, the societal focus seems to be important, and surpasses the individual focus. Thus, people value justice, equity and functioning governance delivering these. In addition, people value the diversity of life options, as well as the overall socio-ecological resilience and multiple dimensions of sustainability -social, economic and environmental. Among nature´s contributions to people, values held for regulating and non-material contributions are much higher than in the previous two key value combinations. Finally, unlike in the previous two cases, values for nature and cultural links to nature are strong, including values for the existence of individual organisms, ecosystems, biodiversity, ecosystem processes and functions, the biosphere as a whole, etc. In addition, this archetypal value combination is also the only one with a stronger consideration of intrinsic values **(Figure 5.11)**.

5.2.2.3.3 Summarising archetypes of values and future development

Based on the quantitative and qualitative synthesis of potential futures and their underpinning values above, the future archetypes can be grouped based on the overall level of their sustainability (according to their overall narrative and potential to reach the SDGs, see above) and their underpinning values, as follows:

- Unsustainable archetypes underpinned by deeply individualistic and materialistic values: Inequality, Regional Competition, Breakdown;
- Less sustainable archetypes underpinned by moderately individualistic and materialistic values: Business as Usual, Economic Optimism;
- Sustainable archetypes underpinned by balanced values with dominant societal focus: Global Sustainable Development, Regional Sustainability.

5.2.3 Capturing values embedded in alternative visions and futures

In order to capture a plurality of values, in addition to the assessment of grey and peer-reviewed literature (section 5.2.2), the review also surfaced values embedded in alternative visions and futures that featured in ILK materials, artistic approaches, creative arts and United Nations documents.

5.2.3.1 Notions of futures and related values in ILK resources

A complementary approach to the peer-reviewed literature and grey literature assessment was conducted, reviewing IPLCs futures works. This consisted of a refined keyword-based search of peer-reviewed and grey literature, supplemented by snowball sampling of illustrative materials and a review of materials submitted through the IPBES call for contributions on ILK. Additionally, a “Philosophies of good living” cross-chapter case study reviewed literature specifically focused on how IPLCs’ philosophies articulate sustainability-aligned values of nature was drawn on.

The scenarios identified in the systematic keyword-based search included local communities (e.g., farmers, urban dwellers, agro-pastoralists) mostly from Canada (Creed *et al.*, 2019), China (Xiong *et al.*, 2020), Germany (Delmotte *et al.*, 2017; Schmidt & Hauck, 2018), Japan (Kabaya *et al.*, 2019) and the Unites States (Burdon *et al.*, 2018). May *et al.* (2019) provide an African perspective related to the linkages between land use in the Greater Serengeti-Mara ecosystem, biodiversity and the delivery of wildlife-related ecosystem services. However, they also state that *‘local variability in certain factors may decrease levels of confidence of the predicted outcomes… [thus], the extent to which this model represents the beliefs of local inhabitants or managers of the protected areas, would be an interesting further development of this model’* (ibid). Similarly, Reinhardt *et al.* (2018) conducted a systematic evaluation of sustainable scenarios across four African case studies (Tunisia, Uganda, Mali, and South Africa) and also emphasized the importance of including local perspectives and active engagement in scenario building.

To specifically find and assess indigenous peoples’ visions or indigenous knowledge in the scenario process and to fill the gaps left by the systematic searches, a snowball sampling of ILK sources was conducted by searching for other articles by the same author and sampling similar keywords found in systematically searched articles. A further 17 peer-reviewed papers, including 49 ILK future scenarios and visions were added to the database. Although not all these sources met all the criteria used in the previous search methods, namely an extended time horizon, multiple scenarios or explicit mention of nature, nature´s contributions to people, or sustainability-aligned values, they still provide insight on how the future is conceptualised or envisioned and how indigenous knowledge is incorporated into the process. Both the refined keyword-based and snowball search results produced futures work from research and academic contexts. Although they mention the importance of including local knowledge through

stakeholder engagement, and the scenarios often incorporate cultural identity, collective welfare, collaborative governance and stewardship, only five papers took participatory approaches by involving local communities, farmers, or fishermen in the formulation of the scenarios. Of these scenarios, overarching themes included consideration of traditional lifestyles, collectivism, subsistence and sufficiency. An excerpt from Kabaya *et al.* (2019, p. 83) mentions nostalgia in futures regarding nature and nature's contribution to people: *'Old fashioned lifestyles and bonds of local communities are preferred among citizens to modern high technologies and individualisms [...]. Nostalgia encourages proactive management of local landscapes as done in the past (e.g., Satoyama)'.*

Responses from the call for contributions on ILK were assessed, and one description of ILK future scenarios and visions was obtained which demonstrates human nature values links very clearly **(Box 5.4)**.

5.2.3.2 Artistic approaches to future scenario development to incorporate multiple types of values

To determine how artistic and arts-based approaches relate to incorporating multiple types of values in future scenarios, 13 papers from peer-reviewed literature examining the use of a wide diversity of artistic approaches (storytelling, performance, paintings, exhibitions, etc.) in future scenarios across different contexts worldwide were assessed. In particular, the evidence was focused on papers with arts-based scenario developments connected to ecosystem services and biodiversity conservation[9]. The assessment focused on exploring three questions:

- How are the arts embedded in scenario-building processes?
- What are the contributions of arts to scenario planning?
- How can the arts foster engagement with values when thinking about sustainable futures?

5.2.3.2.1 How are the arts embedded in scenario-building processes?

Among the assessed scenario-building experiences, audio-visual arts (e.g., drawings and illustrations, exhibitions, video, design) were the most applied artistic disciplines (Bendor *et al.*, 2017), closely followed by the performing arts (e.g., theatre, dance and movement) (Heras *et al.*, 2016; Jiménez-Aceituno *et al.*, 2016). Literary and narrative arts (e.g., science fiction prototyping, storytelling and/or literary works) were, in contrast, less represented (Merrie *et al.*, 2018).

In terms of artistic scenario-building goals, research orientation was frequent, as well as public and/or community engagement. Consequently, arts-based scenarios have been used to involve a diversity of stakeholders, from policymakers and governmental representatives to local communities, academics, civil society representatives or the private sector **(Figure 5.12)**.

All the assessed studies integrated artistic practices using participatory approaches to futures work, seeking active interaction with participants. However, not all the experiences were entirely participatory: in four of the experiences, participants interacted with already created artworks, while in nine, participants were themselves the creators of artworks or artistic expressions.

9. Systematic review of association between values of nature, nature's contributions to people and good quality of life and futures in scenarios, visions and pathways (https://doi.org/10.5281/zenodo.4359655).

Box 5.4 Case study example: the relationship between people and nature in the Alaska Arctic.

In the Alaskan Inuit Food Security Conceptual Framework: How to Assess the Arctic from an Inuit Perspective: Summary Report and Recommendations Report (Inuit Circumpolar Council Alaska, 2015), the connective nature of the Alaska Arctic is stressed and the report illustrates the connections and cumulative impacts of the relationship between people and nature.

'*There is a strong link between sea ice thickness, walrus location and health; between benthic species distribution and health (a key food source for walrus); between a young person taken out to learn how to hunt for walrus, being taught his language, accessing knowledge from older generations, and providing a first catch to an Elder, becoming a provider. The connection continues between the self- and cultural identity rooted in these practices and sea ice thickness. And through the processing of the caught walrus, as community members come together to assist in the processing and storing of the food. Here again, education and language are passed to younger generations as youth learn how to make clothes and art. The feasts, celebrations and games that follow build social cohesion. The connection runs through our economic system and back to our ability to hunt. We rely on parts of this animal to make art. The art created is often sold, and the cash received supports the obtaining, processing and storing of foods through the purchase of items such as fuel, tools and bullets'* (Behe, 2013).

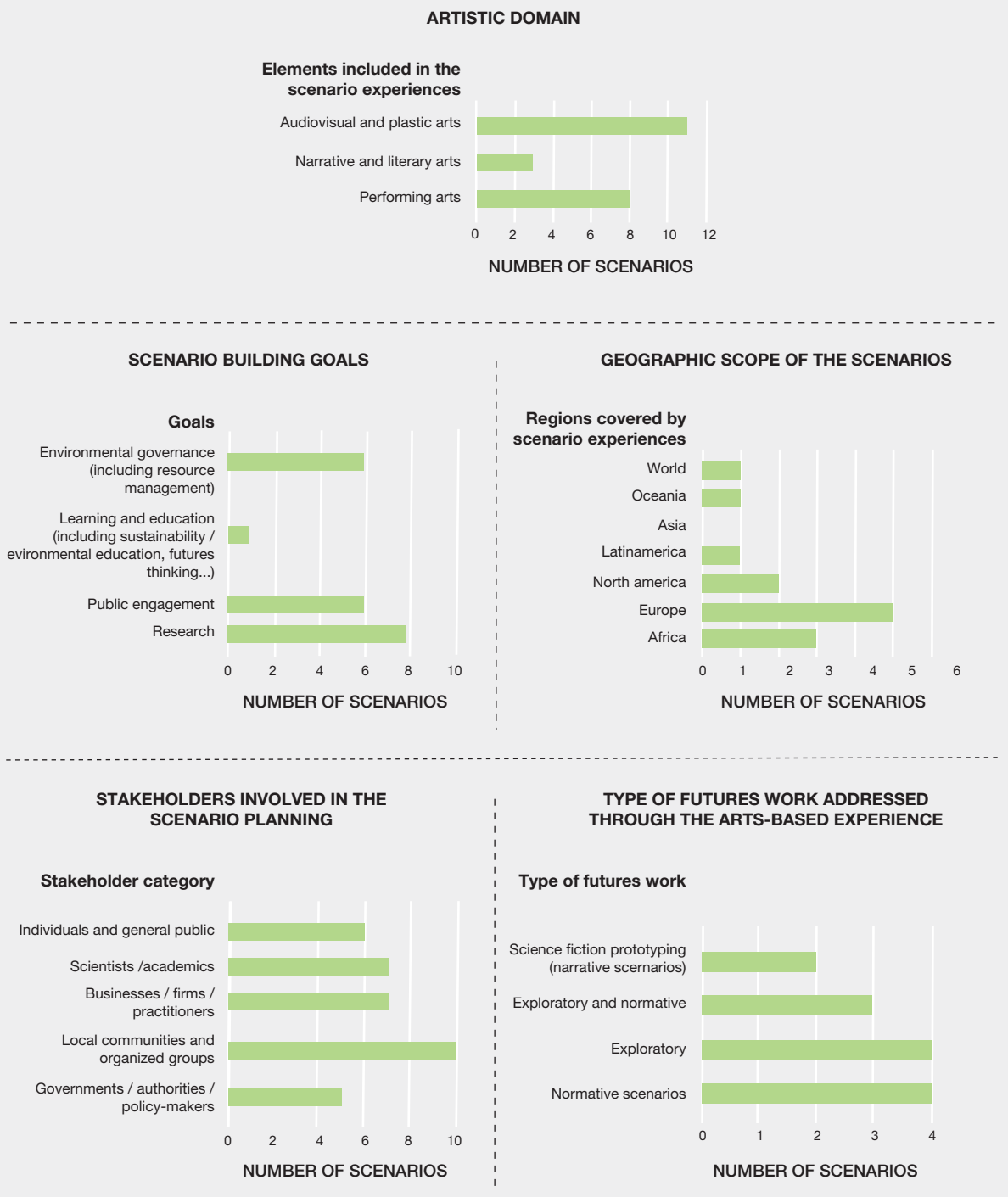


Figure 5 12 **Summary of the assessed artistic scenario-building experiences.**

In participatory art experiences the arts were applied as expressive means for participants, using artistic techniques and tools to create their own outputs related to the future (e.g., performing, drawing, building an artistic artefact). In these experiences, the arts were used both as inputs of and mediums for exploration and discussion of current socio-ecological trends and future projections (Heras *et al.*, 2016; Johansson & Isgren, 2017; Pereira *et al.*, 2020; Selin, 2015).

In those interventions in which participants interacted with artworks created by artists, these were mainly used as creative inputs for reflection, inspiration and discussion (e.g., paintings, sculpture, designed artefacts or to create immersive experiences) (Bendor *et al.*, 2017; Galafassi *et al.*, 2018; Lederwasch, 2012; Pelzer & Versteeg, 2019).

5.2.3.2.2 What are the contributions of arts future scenarios?

Most of the literature assessed proved that arts helped bring together **different knowledge systems**, through integrating different disciplines and including both scientific and tacit, traditional, local and indigenous knowledge of multiple stakeholders into the co-production process. Furthermore, artistic experiences acted as boundary objects to overcome rational ways of knowing and thinking, individually and collectively, and engaging experiential learning as well as aesthetical, affective and emotional knowledge (Bendor *et al.*, 2017; Johansson & Isgren, 2017; Lederwasch, 2012).

Though legitimacy of multiple voices is achieved, in most of the arts-based experiences of scenarios, power issues are not often explicitly addressed. In general, engaging people through artistic practices is recognized to empower participants to take ownership of their own present and future and it may spark collective transformative actions (Galafassi *et al.*, 2018).

Embracing complexity and uncertainties was also recognized to be potentiated by arts (Galafassi *et al.*, 2018; Heras *et al.*, 2016; Pereira *et al.*, 2019) and engaging the imagination in creative processes may increase the capacity to embrace unexpected and generate innovative futures and responses (Pelzer & Versteeg, 2019; Pereira *et al.*, 2018).

While none of the scenarios had an explicit policy-making purpose, the combination of artistic-led experiences and science-led knowledge contributed to exploring the trade-off consequences of decision-making at different scales and for different stakeholders (Galafassi *et al.*, 2017; Lederwasch, 2012; Pereira *et al.*, 2020), and reflected on pathways for transformative change (Galafassi *et al.*, 2018). In some other cases, the exhibition of artistic production (e.g., painting, installations) showed the potential to influence policy design and new collaborations (Johansson & Isgren, 2017; Merrie *et al.*, 2018) **(Figure 5.12)**.

5.2.3.2.3 How can the arts foster engagement with values when thinking about sustainable futures?

Artistic interventions engaged scenario participants with preferences, aspirations and desires mainly related to instrumental and relational values dealing with nature´s contributions to people & good quality of life issues through interactive installations and storytelling (Bendor *et al.*, 2017; Pereira *et al.*, 2019).

By contrast, the potential of the arts to engage with those values inherent to nature seems to be far from being used to its full potential. Only two studies report on how people's intrinsic values can be unlocked through the arts, specifically by using participatory theatre but, interestingly, differently applied throughout the scenario-building process (Heras *et al.*, 2016; Pereira *et al.*, 2020).

Embracing the arts in scenarios is a challenging endeavour. Extra time and resources are needed, as well as engaging expert artists in the process to deal with technical difficulties and disciplinary prejudices (Bendor *et al.*, 2017; Pereira *et al.*, 2018, 2019, 2020). Other challenges were related to how to represent different aspirations and interests in one artwork, how to use applied theatre beyond focusing on immediate facts to address multiple dimensions and action scales contributing to a between understanding of the tensions between values and desires (Heras *et al.*, 2016; Johansson & Isgren, 2017).

Despite these challenges, artistic approaches have potential for successfully exploring and addressing tensions between different types of values, and particularly between intrinsic and anthropogenic values that can lead to further conflicts and deter from achieving sustainable futures. Moreover, beyond the elicitation of values, the experiential and aesthetical encounters offered by the arts can delve into people's bonds with such values and futures elicited. Through these engaging encounters, in which relational, emotional and personal dimensions are brought into play, a sense of the future and connection can be created, potentially infusing action towards the wanted futures.

5.2.3.3 Multiple types of values and depictions of future incorporated in creative arts

In order to understand how multiple types of values and depictions of futures are incorporated in creative arts practices, an assessment was conducted that looked at creative art practices, in their multiple and varied formats, be it an online exhibition, sculpture, film, poem or artefact, that enable us, as gallery goers, or readers (in a broad sense of the term) to engage the imagination in the exercise of envisioning other possible worlds and alternative ways of living. The key results are summarised in **Box 5.5**. with more information provided in the supplementary material[10].

10. Systematic review of association between values of nature, nature´s contributions to people and good quality of life and futures in scenarios, visions and pathways (https://doi.org/10.5281/zenodo.4359655).

Box 5 5 Multiple types of values and depictions of future incorporated in creative arts.

This box summarises evidence on the connection between values and futures based on literature within the creative arts.

In the increasing absence of security and permanence it is necessary to draw on human desire, motivation and imagination to provoke individual and interdependent action from within the collective. As Neimanis *et al.* (2015) state,

> *'Any policy or action aimed at ameliorating environmental problems must take into account human desire, motivation, and values; a deep understanding of the environment cannot be divorced from human imagination, culture, and institutional and social practices'.*

To understand the political, social and economic complexities of ongoing environmental problems cultural forms are needed. Cultural forms assist in connecting geographies to injustice, seemingly casual instances of poverty to global capital and in bringing attention to the ongoing degradation of sensorial engagement with the surroundings.

Four key terms were found to encapsulate the *main values recurring in the consulted material*, in order to move away from naming historical trajectories, or using discipline-specific terminology, which might be opaque to those outside the disciplinary subject area. These terms include issues related to:

- Interdisciplinarity: A plurality of approaches and collaborations are needed to tackle climate change/ environmental crisis (Hessler, 2018; Serres, 1995, p. 216; Yusoff & Gabrys, 2011).
- Sensorial approach: Generating empathy as a future value (Davis & Turpin, 2015, p. 11).
- Interspecies entanglement: The future value is to reconnect with kin, to think beyond human boundaries (Haraway, 1988).
- Social justice: to enact/practice decolonisation/reparation (DeLoughrey, 2019, p. 195).

5.2.3.4 Overview of the private sector visions and values

Visionary documents and corporate reports from ten Global Fortune 500 companies, industry associations, civil society thought leaders, and an alternative trade network conveyed values and implied future outcomes. While individual corporate visions tend to focus on business strategies, public commitments, proposed actions and targets, those that envisioned humanity's future at the global scale recognized complex, adaptive systems and the intertwined nature of society and nature.

Leading global companies and business agglomerations increasingly recognize climate change and loss of nature as risks to business, the global economy, and ultimately, humanity (WEF & Alphabeta, 2020). They further attribute these losses to flaws in the global economic system and formulate visions that diverge from the "business-as-usual" approach of "shareholder profit maximisation".

The corporate visions were more instrumentalist in their view of nature, seeing nature as the provider of materials and services for humanity. Explicit attention on nature's intrinsic value is lacking. Of the corporate cases explored, the most recent went furthest in terms of addressing issues such as human rights (Natura & Co, 2020). Only the alternative trade network emphasized issues of justice, equality, rights, and the redistribution of power and wealth, or addressed development not only of economic growth but also wellbeing, ILK, and non-monetary work (RIPESS, 2015). All documents engaged with the need to decouple the economy from fossil fuels and for new measures of wealth and progress.

5.2.3.5 Values underpinning visions of the future in relevant United Nations documents

Existing United Nations resolutions provide a rich body of evidence for what futures are considered desirable, sustainable, and just. To find out which values of nature and nature´s contributions to people underpin these futures, United Nations resolutions bearing "future", "nature", "environment", "biodiversity", or "rights" in their title were examined. A keyword search for "value" or "valu*" and "nature" or "natur*" was performed within the documents under scrutiny. The following documents were reviewed: Human Rights Declaration (United Nations, 1948); World Charter for Nature (United Nations, 1982); Our common future (United Nations, 1987); the Rio Declaration on Environment and Development (United Nations, 1992a); the Convention on Biological Diversity (CBD, 1992); Declaration on the Rights of Indigenous Peoples (United Nations, 2007); Transforming our world: The 2030 Agenda for Sustainable Development (United Nations, 2015).

The United Nations documents analysed here present a strong justification for the protection of nature based on instrumental, relational and intrinsic values. According to these resolutions, the recognition of diverse values of nature is considered as an integral part of a desirable, sustainable and just future by political decision-makers worldwide.

5.2.4 Key identified gaps highlighted by review of futures works

Evidence is lacking for the following issues related to future scenarios, visions and pathways. More evidence for these aspects in the future would substantially advance the understanding of the link between the underpinning values, potential future development and impacts on nature, nature´s contributions to people and good quality of life:

Content-related aspects:

- To a limited degree, the futures works provide information on which values underpin alternative future development. However, there is a lack of information on whose values these are, how they change when different actors are considered, and the likelihood that different actors and their values and desired futures would be considered. In particular, information was not available on who the winners and losers under different futures (no explicit information in 361 out of 460 reviewed futures) were;
- The information about different kinds of future trade-offs is limited (no explicit information was provided in 271 of 460 futures), and where present, information on trade-offs is largely limited on trade-offs between different kinds of land uses, sectors and nature´s contributions to people/ecosystem services. Trade-offs between different types of livelihoods, interest groups or societal groups were only rarely made explicit in the reviewed futures;
- A large proportion of the futures did not explicitly include any information on justice and equity in outlined future developments (334 out of 460). In most cases where this information was included, it was in general summaries of the inequality levels under different scenarios;
- The futures rarely provide information on specific actors responsible for individual actions influencing future development (287 out of 460 futures included no information on specific policies, decisions or actions, and 123 out of 469 futures included no information on who acts in the scenario or pathway);
- Most futures do not include evidence regarding cross-scale interactions (337), and in many cases on cross-sectoral interactions (280).
- The coverage of futures from selected regions, particularly Africa, and futures covering marine and urban environments, is very weak.

Process-related aspects:

- There is information on who the stakeholders included in scenario development were and whose concerns were included, but no information on whose voices were possibly not included in developing the futures and whose concerns and underpinning values are thus not included;
- The futures tend to fall into archetypal patterns described by the future archetypes. Novel thinking on futures is rare, and descriptions of disruptions of different kinds or radically transformative futures, as well as their underpinning values are rare (no information on tipping point/thresholds/feedbacks in 423 out of 460 reviewed futures; no transformative elements in 415 out of 460 reviewed futures).

Analysis-related aspects:

- Repositories of grey literature, reports and strategic documents are currently not sufficiently developed to allow for an analysis as systematic as the one for peer-reviewed evidence;
- When searching for futures works focusing on impacts on nature, nature´s contributions to people and good quality of life, the requirement of having these elements be addressed in parallel proved limiting and decreased the number of futures eligible for analysis. The focus on only futures explicitly or implicitly addressing values represented a further limitation. This shows that futures explicitly or implicitly addressing values represent a small proportion of all available futures works.

5.3 MOBILIZING VALUES OF NATURE TO ENABLE TRANSFORMATIVE CHANGE

5.3.1 Introduction

A key premise of this chapter is that *'bending the curve of biodiversity loss'* (Leclère *et al.*, 2020) must involve transformative as well as incremental processes of change. This is in line with the first draft of the upcoming Post-2020 Global Biodiversity Framework which is a plan *'to bring about a transformation in society's relationship with biodiversity'* and *'to galvanise urgent and transformative action'*. IPBES (2019) defines transformative change as *'a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values'*. The "depth and breadth" (foundational and systemic) definition of transformative change was adopted and the role of values as part of the process and outcomes of such change were explored for this chapter **(Table 5.3)**. This section, based on a systematic review of literature, begins by summarising current knowledge about the role that values and valuation play in processes of transformative change. It then explores in more detail some specific ways in which values and plural valuation of nature can be mobilized to galvanise transformative change towards a preferred future associated with justice and sustainability.

5.3.2 Understanding the role of values in transformative change

At the 2015 United Nations Sustainable Development Summit, nations agreed on 17 global Sustainable Development Goals (SDGs). The aim of the SDGs is to guide action in areas of critical importance for humanity and the planet. However, these goals refer only to external socio-ecological conditions and do not establish goals relating to the more subjective domain of values. Considering the relevance and impact of values to our motivations and decision-making, this might be considered a major oversight.

The role of values is sometimes referred to as part of the "inner dimension" of sustainability, meaning the inner world of individuals, including mental models, beliefs and emotional connections (Grenni *et al.*, 2020; Horlings, 2015; Ives *et al.*, 2019; Sacks, 2018). To our understanding these are all closely related to values because the distinction (introduced in Chapter 2) between "broad" values as principles (e.g., purposive values, traditional values, altruistic values) and more context-dependent "specific" values as preferences or priorities (e.g., motivations, attitudes, worth, specific goals) was employed. However, values are not confined to the inner realm, they are made explicit in our external lives, for example in advertising campaigns, and they are expressed at different societal levels, from group norms to the laws that govern society. Two ways

Table 5 3 **A values perspective on incremental and transformative change.**

	Incremental Change	Transformative Change
Overview	Actions for sustainability that are accommodated within existing system structures and goals, *e.g., actions that maintain societal goals aligned with material wealth but increase the efficiency of material production and product life-cycle through better valuation of nature that enables improved incentives and regulation.*	Actions for sustainability linked to processes of systemic change that reconfigure human-human and human-nature relations, *e.g., actions that shift societal goals beyond material wealth by changing the set of broad values that underpin notions of human progress.*
Spheres of intervention	Valuation interventions that are applied in the practical sphere of production, exchange and consumption. These can be scaled up – becoming more transformative – by embedding in institutions. *E.g., interventions to recognise and account for diverse values of nature can be institutionalized through systems of accounts, policies or legal instruments.*	Change that may begin in one sphere of society, such as the practical, but spreads to other spheres to become system-wide, across practical, structural, personal and cultural spheres that collectively shape human-human and human-nature relations. *E.g., interventions that give voice to alternative worldviews and values, with longer-term potential to change societal norms and goals.*
Values as leverage points	Working with values as shallow leverage points. This includes interventions to directly shift specific values such as consumption preferences through changes to practical system parameters (e.g., taxes, quotas, standards, land use planning). This is where the majority of work on values and valuation in recent decades has been seen, especially through progress in environmental economics to inform the design of incentives for pro-environmental behaviour.	Working with values as deep leverage points. This includes interventions to mobilise broad values for sustainability, such as care for nature and concern for justice. Operating such deep, underlying value levers is considered to be difficult, but with the potential to galvanise system-wide and more stable change. Shifting societal norms in ways that enable changes to societal goals and paradigms is inseparable from issues of power because it changes whose values count.

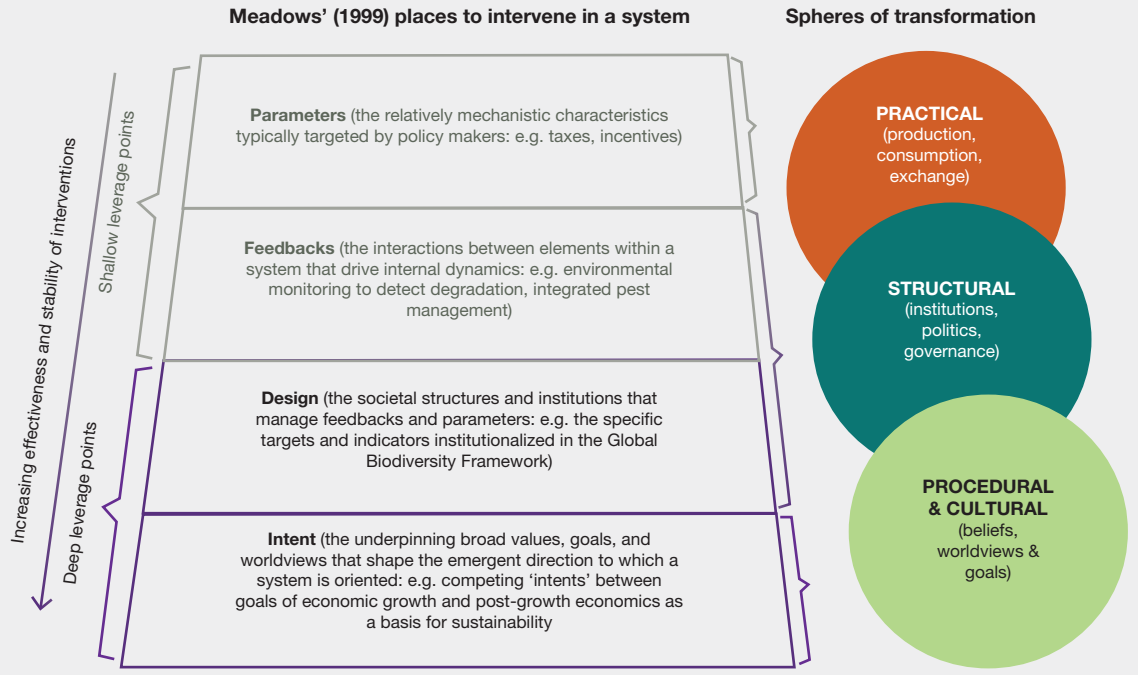


Figure 5 13 **Types of leverage points for system interventions (adapted from Abson *et al.*, 2017) aligned with spheres of transformation (based on O'Brien, 2018).**

of working with values are considered. One is about shifting and enabling those broad or specific values that are aligned with sustainability (see below the notion of "mobilizing sustainability-aligned values")[11]. The second is about promoting a more plural valuation of nature that allows expression and incorporation of the diverse ways in which people value and relate to nature. These two ways are connected, in the sense that plural valuation can be expected to enable values by increasing their visibility and influence for individual and societal decision-making.

Faced with the objective of transformative change, one of the crucial questions to be asked is to what extent societal transformations can be designed and governed. Historically, major transformations such as those accompanying industrialisation and the widespread commodification of nature were not envisioned and intentionally directed. However, the environmental crisis provides a context in which the future of humanity now seems dependent on such directed transformation (Fazey *et al.*, 2018). Whilst there is not yet agreement about the extent to which such direction is possible, there is general agreement that values operate as an enabling factor for sustainability transformations (Chan *et al.*, 2018; Demski *et al.*, 2015; Loorbach *et al.*, 2017) and that shifts in the kind of values that dominate decision-making will be necessary for both initiating and driving sustainability transformation (Ajibade, 2019; Vivero-Pol, 2017). Shifts in values are often found to come about as adaptive responses to socio-ecological conditions (Manfredo *et al.*, 2017), including response to crisis (Kenter *et al.*, 2019). Importantly, however, there is also evidence that values can be more proactively worked with, for example by using deliberative dialogue methods to explore values and even promote changes in values (Kenter *et al.*, 2016). Furthermore, changes in institutions (such as education, legal and taxation systems) can shift which values are formally articulated and widely acted on. This capacity to intentionally work with values (e.g., to shift values, to develop shared values or to change the salience values via institutions) is why researchers consider values as important leverage points for transformation.

5.3.2.1 Values as leverage points for transformation

Building on the definition of transformative change (IPBES, 2019), leverage points were considered to be those places in socio-ecological systems where interventions can contribute towards fundamental and system-wide reorganization (Abson *et al.*, 2016). Furthermore, broad values were considered as particularly associated with points of deeper leverage: places where relatively small shifts can produce large and comparatively durable movements. Abson *et al.* (2017) discuss four types of

11. Role of values in transformational change (https://doi.org/10.5281/zenodo.4363069).

leverage points: the parameters, feedbacks, design, and intent of a given system **(Figure 5.13)**. "Parameters" and "feedbacks" are considered as shallow leverage points. These are easier to implement but only bring about incremental change, resulting in "little change to the overall functioning of the system" (Abson *et al.*, 2016). *Design* and especially *intent* are deeper leverage points that include the values, goals and worldviews that shape and guide the overall behaviour of systems (Abson *et al.*, 2017; Fischer *et al.*, 2012; Meadows, 1999). Corresponding with this typology of intervention points, broad values are associated with transformative change, with a role to play in foundational and system-wide change. Specific values would mainly be associated with shallow intervention points, for example, changing consumption preferences towards a more sustainable product might be achieved through actions to change "parameters", through the use of taxes, subsidies or standards. Such shallow leverage points are an important part of our response to the nature crisis but – in the absence of deeper forms of change – they are unlikely by themselves to bring about the transformative change that is now needed.

The evidence does not suggest a simple, linear connection between broad values and transformation. Rather, there is a cyclical, non-linear relationship in which values are part of both the process of change and the outcome of change. For example, when Polanyi (1944) described industrialisation in England as *'the great transformation'*, he was referring not only to a profound economic and technical transformation, but also to a shift in mentalities, including from collectivist to individualist values, that was both process and outcome. Equally, contemporary scholarship on the role of values in sustainability includes calls to revive values of collective solidarity – again as both process for and outcome of transformative change **(Box 5.6)**.

Paying greater attention to the role of values in sustainability is also about recognising the value of non-Western paradigms and worldviews, including efforts to decolonise conservation (Chilisa, 2017; Vásquez-Fernández & Ahenakew pii tai poo taa, 2020). For example, the *intent* for area-based conservation has traditionally been defined by biodiversity conservation, for example the IUCN's 2008 definition of protected areas includes the intent *'to achieve long term conservation of nature with associated ecosystem services and cultural values'*. A shift towards recognising alternative worldviews, including those rooted in more relational values, is associated with the emergence of a new "conserved area paradigm" where the primary management objective might not always be conservation *per se* (e.g., it might be caring for ancestors or cultural revitalisation), but where effective conservation is an outcome (Jonas *et al.*, 2014; Laffoley *et al.*, 2017). Such a shift in goals, reflecting more diverse values of nature, could produce important gains for future effectiveness. For example, such recognition can help to build on the comparative success of indigenous and community models of conservation (Dawson *et al.*, 2021) and to avoid the potential harms that could arise from expansion of a "protected area" paradigm that continues to employ a narrow set of values (4.5.2).

5.3.2.2 Values and spheres of transformation

The concept of "spheres of transformation" is used to explain the required breadth or "system-wide" nature of transformative change. Systemic socio-ecological change is understood as change that spreads across different "spheres" of society, such as technology, the economy, culture and politics (e.g., Harvey, 2010; Kothari, 2018; O'Brien & Sygna, 2013; Pelling *et al.*, 2015). An adapted typology developed by O'Brien & Sygna (2013) was pared down to three broad societal spheres of transformation **(Figure 5.13)**:

- **The practical sphere** consists of actions that directly manage everyday practices of production, exchange and consumption, for example through systems of incentives to change individual consumption choices or technology choices by businesses. In relation to values of nature, this sphere consists of valuation practices (from singular to diverse) and their uptake in practices such as the design of market-based interventions, subsidies for green technologies or local land use plans.

- **The structural sphere** consists of the formal and informal institutions that contribute to the design of socio-environmental systems and which "structure" human-human and human-nature interactions. Institutions, such as markets, shape the relationship between individuals and organizations in ways that produce regular and predictable patterns of decision-making behaviour. Formal institutions such as legal systems, together with informal institutions such as gender norms, express and operationalise underlying values. The design of institutions thereby gives force to those values they reflect whilst at the same time making it hard to express and act in accordance with those values that they don't. As has been emphasized in earlier chapters, formal institutions currently articulate a narrow range of instrumental values of nature, at the expense of more diverse values of nature. As such, institutions are an important target for transformative change because they currently lock in values that produce unsustainable outcomes and changing them has the potential to mobilize values more aligned with sustainability.

- **The personal and cultural sphere** consists of the subjective and intersubjective "inner" realm of society. This includes the identities, beliefs and worldviews that

contribute to shaping how humans relate to nature and to each other. This sphere of individual and social beliefs is strongly associated with the normative (what future should be pursued) and therefore influences the kind of futures that can be envisioned as possible and desirable, contributing to societal capacity to change goals and to transcend paradigms. As such, the personal sphere also influences how people respond to institutions and institutional changes.

Analyses of historical transition and transformation tell us that change can begin in any sphere of society, but it will not be transformative (fundamental and system-wide) if it remains confined to a single sphere (Geels, 2002, 2014; Harvey, 2010; Kothari, 2018; Pelling *et al.*, 2015). This means that practical interventions such as technology innovation, expansion of the protected area network, removal of fossil fuel subsidies or payments for ecosystem services might be important contributors to (incremental) change, and could even be at the vanguard of transformative change. However, whilst such practical actions may be crucial, they will not themselves be transformative of the biodiversity crisis without accompanying changes across other spheres. This implies that transformative change requires working with values at different levels – valuation as a basis for changing incentives; institutional reforms that enable the normalisation of decisions consistent with sustainability-aligned values; and societal changes that empower more diverse worldviews and shifts in societal norms and goals (Benatar *et al.*, 2018; Christie *et al.*, 2019; Grenni *et al.*, 2020; Kendal & Raymond, 2019).

Currently, most action for sustainability targets the practical sphere due to the relative ease of this type of intervention (Abson *et al.*, 2017; Meadows, 1999; O'Brien, 2018). For example, efforts to improve valuation of carbon storage have supported practical interventions such as carbon offsetting and payments for ecosystem services. Whilst working with values at the level of "parameters" (Meadows, 1999) provides some of the necessary conditions for effective interventions in the practical sphere, these are considered unlikely to transform society's relationships with nature if they are not linked to wider changes across institutional and personal-cultural spheres (Holt *et al.*, 2012; Melathopoulos & Stoner, 2015; Saarikoski *et al.*, 2018; Tadaki *et al.*, 2020). But equally, working with values at the level of intent (5.3.3) – in the personal sphere – can also be insufficient, for example where personal motivation to purchase "green" products is constrained by system design that renders these products unavailable or unaffordable (Steg, 2003).

5.3.2.3 Mobilizing values for transformative change

The role of values in transformative change has so far been described in terms of the depth of value-based leverage points and thus the potential for galvanising system-wide change. Here, this process is described as "mobilizing values" which is defined as actions that either change values or enable values **(Table 5.4)** in ways that increase the salience of diverse values, including those widely agreed to be aligned with prevailing ideas of sustainability (such as the SDGs) and those previously marginalised due to power inequalities (such as values of indigenous peoples and local communities). Changing values can operate at the level of broad values, for example through education that might eventually shift principles relating to human-nature interactions (e.g., how animals are treated). It can also operate at the level of specific values, for example through improved systems for the economic valuation of nature, shifting consumption preferences. Enabling values

Table 5.4 **Mobilizing values for transformations to just and sustainable futures.**

	Broad Values	Specific Values
Changing Values	Actions to shift deeply held principles that shape human-nature relationships. *For example formal and informal systems of "education for sustainability".*	Actions to change preferences and priorities related to production and consumption behaviours. *For example, payments for ecosystem services that shift land use preferences in ways that conserve biodiversity.*
Enabling Values	Actions that enable existing values aligned with sustainability to be articulated and/or acted upon. This requires forms of politics and governance that are more inclusive, linked to uptake of more diverse values in formal and informal institutions that shape everyday practices. *For example, rights-based declarations that recognise alternative knowledge and values held by indigenous peoples and local communities.*	Actions that overcome barriers to acting on existing pro-environmental preferences such as green consumerism. Again, such actions need to target institutions such as legal systems or property rights, in ways that create the contexts that allow people to act in ways consistent with these values. *For example, financial incentives that make greener and fairer consumption options more affordable.*

can also operate at different levels. Structural interventions that empower marginalised groups of people, such as the institutionalisation of rights-based approaches to conservation, can enable recognition of more diverse values, including systems of values linked to relational worldviews. More practical interventions such as better labelling of consumer products can enable individuals to enact their preference for green consumerism.

Mobilizing values for transformations to sustainability requires some understanding of the types of values wanted to be mobilized. The values assessment makes a general case for mobilizing a greater diversity of values of nature, especially to overcome the relative neglect of relational values. But as reported in Section 5.2, visions of sustainable futures tend to be aligned with particular combinations of values. While people can hold and/or express many broad and specific values, only some of these are considered to be aligned with sustainability outcomes such as achieving SDGs. For example broad values based on care and stewardship for nature are considered to support sustainability (Namazkhan *et al.*, 2019) whereas egocentric values are not (Kendal & Raymond, 2019).

5.3.2.4 Sustainability-aligned values

The term *sustainability-aligned values* is used to refer to those broad values (e.g., care for nature, solidarity among humans) that are found to be associated with future scenarios linked to achievement of SDGS or to be more generally supportive of transformations towards just and sustainable futures. The plurality of knowledge and worldviews is acknowledged, and therefore the different ways of viewing sustainability and different ideas about the sets of "sustainability-aligned values". However, there is noteworthy agreement among researchers that pathways to sustainability will require shifts from broad values of individualism and economic profit to sustainability-aligned values of collectivism, care and equality. Though relationships between values and behaviour are complex, mobilizing sustainability-aligned-values (e.g., through shifting values and enabling values **(Table 5.4)**) is likely associated with sustainable behaviour **(Box 5.6)**. Pathways to sustainability can be supported by actions that help to mobilize both human-human values (such as solidarity) as well as human-nature values (such as stewardship).

Mobilizing sustainability-aligned values often involves confrontation with dominant values and with the powerful actors whose interests are entwined with these. For this reason, changing power relations is widely identified as a core requirement of transformative change (Harvey, 2010; Healy & Barry, 2017; Holland, 2017; Martin *et al.*, 2020; Pelling *et al.*, 2015; Scoones *et al.*, 2015; Stevis & Felli, 2015; Temper *et al.*, 2018). Power relations are crucial in determining which values and whose values dominate decision-making, including what values are subject to formal valuation procedures, what values gain traction in decision-making and whose visions of the future influence policy-making (Feola, 2019; Fernandes & Guiomar, 2016; Geels, 2002; Hakkarainen *et al.*, 2020; Tschakert *et al.*, 2016).

The process of mobilizing values through efforts to *enable* sustainability-aligned values involves giving salience to and institutionalising values that have previously been marginalised. This involves changing the balance of power away from incumbent regimes, whether that power is exerted through economic, political or discursive forces (Geels, 2014; Holland, 2017; Newell, 2015; Scoones *et al.*, 2015). For example, the granting of legal rights of personhood to rivers in New Zealand, Colombia and India has been praised by many as a process that has enabled existing sustainability-aligned values of indigenous peoples and local communities to be recognised and enacted. Enabling this shift in the salience of values (which and whose values influence policy) had involved networks of actors struggling for these rights in the media and in the courts, in the face of competing political and economic interests. The achievement of more plural valuation of nature can therefore be seen as inseparable from ecological democratisation and empowerment (Ajibade & Adams, 2019; Katrini, 2018; Miller *et al.*, 2014; Stirling, 2015; Vivero-Pol, 2017). *'Transformative governance thus is in essence about changing power dynamics to emancipate those stakeholders who hold transformative sustainability values'* (Visseren-Hamakers *et al.*, 2021, p. 24).

One of the most powerful constraints on mobilizing sustainability-aligned values is a prevailing paradigm of development that prioritises economic growth. The economic structures serving this societal goal are observed to drive unsustainability whilst also increasing social inequalities. Maintaining current economic growth relies on increasing the material throughput of the economy, with poorer regions of the world disproportionately bearing the resultant costs of ecosystem degradation (Martínez-Alier *et al.*, 2016). This unequal environmental exchange (Rice, 2007) raises questions with regards to the plausibility of sustainability transformation within the constraints of the growth paradigm, and the associated disconnection from nature and from other humans (Villido, 2018). Improving knowledge of these unsustainable and unjust outcomes is leading to growing questioning of the paradigm of economic growth (Future Earth, 2021; PECS, 2021; Resilience Alliance, 2021). But whilst this understanding points to alternative futures associated with values such as enoughness, sufficiency, and frugality, such sustainability-aligned values don't even get represented in high level visions of "sustainability". For example, the value of "sufficiency" is typically omitted from future scenarios, in favour of the more growth-friendly value of "efficiency" (Feola, 2019). Again, this reinforces the finding

Box 5 6 Sustainability-aligned values reported in transitions and transformations literature.

Sustainability-aligned values are broad values concerning those human-human relationships (1) and human-nature relationships (2) that are often associated with transformations to just and sustainable futures. Among the reviewed papers which explicitly identified values belonging to a sustainability transition or transformation, 73% specified human-human values and 27% specified human-nature values (concerning human relations with other-than-human nature).

1. Human-human sustainability-aligned values

The creation and recognition of values concerning the relation to other humans are described as crucial steps towards transformations to sustainability (Vinnari & Laine, 2017). These values are seen to move beyond individualism (e.g., Feola, 2019) and material wealth (e.g., Katrini, 2018) and focus on care, unity and justice.

a) Care: love, solidarity, responsibility (I care for you)

- with the synonyms *solidarity, caring or care, compassion, altruism, generosity, love, responsibility, honesty, tolerance, reciprocity, trust and loyalty* (Ajibade, 2019; Benatar *et al.*, 2018; Choy, 2014; Christie *et al.*, 2019; Ives *et al.*, 2019; Katrini, 2018; Kenter *et al.*, 2019; Kothari, 2016; Millet & Casabianca, 2019; Vinkhuyzen & Karlsson-Vinkhuyzen, 2014; Vinnari & Laine, 2017; Wensing *et al.*, 2019).

b) Unity: (sense of we)

- with the synonyms *empathy*, unity, sense of "we", Guanxi (characterised by thinking of what is better for the group, not the individual), sense of community, consideration of all living beings* (Choi, 2018; Choy, 2014; Christie *et al.*, 2019; Ives *et al.*, 2019; Vinkhuyzen & Karlsson-Vinkhuyzen, 2014; Vinnari & Laine, 2017).

*Empathy is listed here under "unity", since empathy is understood in the literature as *experiencing another being's feelings*, while compassion describes caring and acting upon this concern.

c) Equity and justice (You have the same rights and duties as me)

- with the synonyms *justice, equity, equality, fairness, commons perspective, diversity, and democratic struggle* (Ajibade, 2019; Benatar *et al.*, 2018; Christie *et al.*, 2019; Edens & Lavrijssen, 2019; Jenkins *et al.*, 2018; Kenter *et al.*, 2019; Stirling, 2015; Vinkhuyzen & Karlsson-Vinkhuyzen, 2014; Vivero-Pol, 2017).

d) Participation and democracy (Rights to be included),

- with the synonyms *participation, democracy, democratically negotiating diverging interests, equal access to decision-making* (Fernandes & Guiomar, 2016; Horcea-Milcu *et al.*, 2019; Jenkins *et al.*, 2018; Turhan, 2016).

2. Human-nature sustainability-aligned values

With regard to broad values concerning society's relationship with other-than-human nature, the literature on transformations and transitions emphasize the importance of general pro-environmental values (Leiserowitz, 2006; Wensing *et al.*, 2019). Where particular broad human-nature values are specified, they consistently refer to *care and respect for the natural environment* with the synonyms *environmental stewardship, concerned by all forms of life, empathy for non-humans* (Ajibade, 2019; Antadze & McGowan, 2017; Christie *et al.*, 2019; Vinnari & Laine, 2017).

that dominant values are linked with power relations and that mobilizing sustainability-aligned values will require rebalancing whose values count – to enable previously marginalised values often means to constrain some more dominant values. Equally, it reinforces the claim that the *intent* of the system is an important place of leverage for promoting transformative change **(Figure 5.13)**.

5.3.2.5 Working with values

For values to act as leverage points two main premises should be understood: firstly, that values correspond in some way to social and ultimately individual behaviour and secondly, that values are changeable. The individual behaviours of particular relevance to this assessment are those that directly benefit biodiversity, for instance via stewardship, consumption, social or lifestyle choices, and donations (Selinske *et al.*, 2020). Many other behaviours may, however, have an indirect link to nature and to just and sustainable futures.

As discussed in Chapter 2 Section 2.5., value formation is a process of maturation that takes place early in life (Keil, 1922; Piaget, 1952), but value change can occur across a lifetime depending on individual experiences and interactions with society and the environment, such as formal and informal education, social practices, group conformation processes, or socio-ecological events (e.g., natural disasters) (Kendal & Raymond, 2019; Manfredo *et al.*, 2020). There is strong agreement in both the sustainable futures literature (see 5.2) and the sustainability transformations literature that *mobilizing broad values that are aligned with sustainability and constraining those that are not* is needed. Nonetheless, working to increase

the salience of these sustainability-aligned values can be extremely challenging. When dealing with broad values, they are relatively slow to change, and relatively stable (Ives & Kendal, 2014). Furthermore, there are significant barriers to change for example the above-mentioned power structures and the political economies that support them.

Interventions to increase the salience of sustainability-aligned values need to be based on an understanding of how to mobilize (cultivate or activate) those values that support sustainable outcomes (Horcea-Milcu *et al.*, 2019; Miller, 2013). According to O'Brien (2018), this '*implies less attention to altering or manipulating people's behaviour, and more on creating the conditions that promote the development and expression of social consciousness and futures consciousness'* (but see also Westley *et al.*, 2011). Interventions that aim to enable sustainability-aligned values may refer to removing barriers (e.g., Gregori *et al.*, 2019; Nassl & Löffler, 2019), fostering pre-existent ethics or equity principles (e.g., Soto & Sato, 2019), or creating contextual conditions that enable people to act on their values (e.g., Choy, 2018). The literature that explicitly discusses working with values to promote transformations to sustainability remains relatively small. Our review identified an equal split between those addressing the need to change values and the need to enable values (15 publications each)[12].

In summary, there are two main value-related pathways through which interventions can galvanise transformative change. First, they can try to change people's values (promoting the incorporation of sustainability-related values and reducing non-sustainable-related values). Second, when people already hold sustainability-aligned values but due to other conditions or barriers do not act on them (e.g., due to competing motivations, lack of resources, or physical constraints), then interventions can aim to create favourable conditions that render people free to act in ways consistent with their values. In that sense, behaviour change interventions can close or *bridge* the value-action gap. The following sections further explore how this has been addressed.

5.3.3 Mobilizing values in societal interventions for sustainability transformations

Large-scale changes in behaviour can be driven by shifts in social norms, defined here as the shared understanding of what behaviour is considered socially acceptable in particular contexts (Cialdini *et al.*, 1990; Nyborg, 2018; Ostrom, 2000). By acting as a link between the individual and the world around them, social norms can support pro-environmental behaviour, when reinforcing sustainability-aligned values collectively. Illustrative examples for the power of social norms are the growing popularity of plant-based food, changing attitudes towards (short-haul) flights in some western countries and the growth of climate justice activism such as the Fridays for Future youth movement. Social norms may be adaptive to changing social and ecological conditions but can also be influenced through political interventions, either directly through active norm management or indirectly by increasing the visibility and impact of socially desirable behaviour (Farrow *et al.*, 2017; Kinzig *et al.*, 2013).

Research findings lean towards the potential for bottom-up, participatory and civil society oriented methods for empowering shared cultural practices linked to sustainability-aligned values (Daskalaki *et al.*, 2019; Milchram *et al.*, 2019; Moore *et al.*, 2015; O'Brien & Sygna, 2013; Zhou *et al.*, 2018). The methods found to be effective involve co-creation of shared norms and include social learning across small-scale community initiatives (Kothari, 2016), community performance of alternative practices (Daskalaki *et al.*, 2019), disruptive practices and resistance (Stirling, 2015; Temper *et al.*, 2018), social movements (Christie *et al.*, 2019; Temper *et al.*, 2018). The participatory development and promotion of positive alternative practices is one key strategy (Kothari, 2016; Temper *et al.*, 2018). For example Daskalaki *et al.* (2019) present evidence from grassroots networks in Greece, in which (in the context of economic crisis) shared values co-evolve with the development of new collective practices, in this case alternative, non-monetary systems for exchanging goods and services.

Processes of deliberating and co-producing values can have an important reflexive effect on the personal and collective inner dimension of sustainability. Values that are co-produced during participatory and deliberative processes can trigger critical consciousness of the failings of existing system qualities, a reflexive social learning process that some scholars consider an important premise for transformative change (Grenni *et al.*, 2020; O'Brien & Sygna, 2013; Popa & Guillermin, 2017; Tschakert *et al.*, 2016; Villido, 2018). However, some publications also refer to national level interventions in policies and governance (Kaye-Zwiebel & King, 2014; Schösler *et al.*, 2013), environmental education measures (Liobikienė *et al.*, 2020), or greater access to information that is expected to shape values (Millet & Casabianca, 2019).

To transformations literature emphasizes the process-oriented nature of working with values, including frequent discussion of processes of reflexivity and values transparency (22 publications). This may refer to: being transparent and explicit about the values that are shaping decision-making and that underpin alternative transformation pathways (Feola, 2019; Turhan, 2016); exercising personal awareness and practising critical

12. Role of values in transformational change (https://doi.org/10.5281/zenodo.4363069).

reflexivity (Popa & Guillermin, 2015; Villido, 2018); developing or identifying explicit ethical principles based on critical reflection of human-nature relationships (Benatar *et al.*, 2018; Novikova *et al.*, 2019; Schmidt, 2019), and more broadly challenging assumptions about the world (O'Brien, 2018). For example, the examination of social values is key to understanding how the local use of forest resources changes (Nassl & Löffler, 2019), how public acceptance of energy systems (e.g., wind energy) forms (Demski *et al.*, 2015), or how shared values underlie alternative agriculture models such as agroecology (Plumecocq *et al.*, 2018). Systematically bringing to the surface and being explicit about the values underpinning ideas and decisions can contribute to transformative change in some contexts (Pereira *et al.*, 2018). This is also applicable to research itself, where it is important to be aware of how values can (consciously or unconsciously) shape the choice of scientific models and approaches (Horcea-Milcu *et al.*, 2019) and thus how personal factors including epistemology can shape scientific inquiry (van der Hel, 2018).

Other frequently mentioned process-based interventions in relation to the mobilization of values for transformative change are deliberative processes (15 publications) and knowledge co-production (10 publications). Authors link deliberation to opportunities for empowerment (O'Brien, 2018) and representation of marginalised groups (Hakkarainen *et al.*, 2020) by making the diversity of values more visible. For example, sustainable models of urban resource co-management depend on extended participation at all levels of decision-making (e.g., Katrini, 2018; Thornton *et al.*, 2019), despite some authors also pointing out the shortcomings of deliberation such as the lack of accountability (Melathopoulos & Stoner, 2015). The co-production of knowledge literature is one field of science where the literature has a more substantial track-record on the relationship between values and desirable change, by for example recognising that it is necessary to inquire about values rather than simply generate actionable knowledge in order to achieve transformative change (Miller *et al.*, 2014; Seidl *et al.*, 2013).

Processes that bring a plurality of values to the surface can enrich dialogue and increase legitimacy and resilience of decisions. However, it is also recognised that such diversity can have a paralysing effect. For example, the Flemish Nature Outlook 2050 (Michels *et al.*, 2019) gives an account of both positive and negative effects of stakeholder participation when developing and debating alternative pathways. Whilst the negotiation of contested values is an important step towards sustainability (Scoones *et al.*, 2015), this process is deeply connected to power relations (Patterson *et al.*, 2017) and can therefore be complex and unpredictable. Differences in values between stakeholders can be a driver of competition and conflict (Ajibade, 2019; Busch *et al.*, 2018; Christie *et al.*, 2019; Milchram *et al.*, 2019; Patterson *et al.*, 2017; Sharpe & Barling, 2019; Turhan, 2016; Vinnari & Laine, 2017) and can undermine the acceptability of policy interventions (Choi, 2018; Demski *et al.*, 2015; Millet & Casabianca, 2019; Mok & Hyysalo, 2018; O'Brien & Wolf, 2010). Again we must consider that, such conflicts play out in the context of asymmetrical power relations, in which values that act against sustainability (such as individualism) can prevail because they are embedded in, and protected by, dominant political-economies and incumbent resource regimes (Christie *et al.*, 2019; Feola, 2019; Fernandes & Guiomar, 2016; Geels, 2014; Melathopoulos & Stoner, 2015; O'Brien & Sygna, 2013; Plumecocq *et al.*, 2018; Temper *et al.*, 2018; Vinnari & Laine, 2017).

5.3.4 Mobilizing values to enable individual behaviour change for sustainability transformations

At the individual level the link between values and human behaviour has been made by a diversity of behavioural theories, for example the values-belief-norm model (Steg & Vlek, 2009) and the cognitive hierarchy model (values-attitude-behaviour) (Fulton *et al.*, 1996; Ives & Kendal, 2014). Chapter 2 of this assessment reviewed 134 behaviour change theories and found that 91% of these include at least one value-related concept as an influencer of behaviour. However, whilst people's values are regarded as a crucial factor underlying individual and social environmental behaviour, this is not a linear relationship by any means. Two main causes can explain this. Firstly, people hold a myriad of broad and specific values, some of which are directly or indirectly responsible for the loss of biodiversity. Key examples of such competing values, ideologies and worldviews are those that drive economic growth, consumerism and land expansion, such as the pursuit of personal wealth, status, egoism, etc. (Gifford, 2011; Heath & Gifford, 2006; Lindenberg & Steg, 2007; Nordlund & Garvill, 2002). Secondly, values are just one of the elements that condition behaviour. This topic has been addressed in the "value-action gap" concept (Antimova *et al.*, 2012; Babutsidze & Chai, 2018; Barr, 2006; Blake, 1999; Gifford, 2011; Young *et al.*, 2010) which describes that the link between values and behaviour may be relatively weak due to the various other factors that influence behaviour.

In Section 5.3.3 it was reported that mobilizing sustainability-aligned values can be necessary for transformative change towards sustainability. However, when looking at specific, individual pro-environmental behaviours (rather than system-wide transformative change), then sustainability-aligned values *on their own* are neither a necessary nor a sufficient condition for such behaviours to occur. This distinction is important when thinking about interventions and policies and an example is presented as

follows. A person with sustainability-aligned values may be more inclined to act pro-environmentally, for instance by buying organic tomatoes instead of conventional ones, and this may be reinforced when the organic tomatoes also taste better (Steg *et al.*, 2016). However, this person might still buy conventionally grown tomatoes when the organic ones are regarded as too expensive or when buying them requires additional effort to go to another shop. Similarly, a person with sustainability-aligned values may not separate plastic waste when no recycling bins are available or use the car when public transport options are not frequent enough (Steg, 2003). In these cases, the physical conditions to engage in pro-environmental behaviour are unfavourable to acting on sustainability-aligned values. Sustainability-aligned values are hence not a sufficient condition to pro-environmental behaviour. On the other hand, a person can act pro-environmentally even without holding sustainability-aligned values, when pro-environmental behaviour is in line with other values, goals or motivations such as saving money, making a good impression, or following a social norm. If an electric car is cheaper than a diesel or petrol car, then even a person whose only concern is to save money may make a pro-environmental choice (Stern, 2000; Stern *et al.*, 1999). Similarly, a farmer may preserve trees on her property not because of her pro-environmental values, but because tree cutting is illegal and would result in a fine. These examples show that sustainability-aligned values are also not a necessary condition for pro-environmental behaviour, and that particular regulatory approaches (those that address the "practical sphere", see 5.3.3) may substitute for mobilizing values. However, behaviours merely induced by regulation may not galvanise system-wide or durable change and would not by themselves be transformative (Abson *et al.*, 2016; Manfredo *et al.*, 2020). It is therefore crucial to understand how public policies can generate the enabling conditions for changes in underlying individual sustainability-aligned values (the "personal sphere") and for appropriate institutional and social arrangements that change and express social values (i.e., the "structural sphere" (Rare and The Behavioural Insights Team, 2019)).

5.3.4.1 The behaviour change wheel framework as a tool for linking values, behaviour and sustainability transformations

Integrative behaviour change frameworks can help policymakers handle the complex links between values, behaviour, interventions and policy (Klöckner, 2013). This section introduces the behaviour change wheel (Michie *et al.*, 2011, 2014; PHE, 2020) as an integrative framework that systematizes factors that enable or hinder behaviour change and provides guidance on how to design and evaluate targeted interventions and policies. Although originating from the health sector, the behaviour change wheel has been applied to pro-environmental behaviour change (Axon *et al.*, 2018; Gainforth *et al.*, 2016; Wilson & Marselle, 2016) and conservation behaviour related to pollinator protection (Marselle *et al.*, 2020).

The behaviour change wheel has three layers **(Figure 5.14)**. At its centre is a "behaviour system" involving three essential components involved in enabling behaviour: Capability, Opportunity and Motivation (COM-B). Changing any behaviour of an individual, group or population involves changing one or more of these three components (Michie *et al.*, 2014). The COM-B components are defined and exemplified in **Table 5.5** below. The COM-B components are surrounded by different types of interventions (the red middle layer) and policy options (the grey outer layer). The intervention types (e.g., education, rewarding, restrictions, enablement)[13] are the means by which an intervention can change behaviour. The outer layer of the wheel includes the policy options that can deliver or support the implementation of the interventions. **Table 5.6** provides definitions and examples of the different intervention types and policy options. It is important to highlight that there is no one-to-one correspondence between the policy options, intervention functions and the COM-B components. Rather, specific COM-B components can be influenced by a range of intervention types and any intervention type can influence several COM-B components. Similarly, a specific policy can support several types of interventions and any intervention type could be delivered by different policy options.

As argued in Chapter 2 of the assessment, the concept of "values" is in itself complex, comprising many different constructs that relate to "broad" and "specific" values. Furthermore, whilst values are important, they need to be understood in terms of their link to behaviour in order to achieve the desired impact for sustainability and conservation. For this reason, **Table 5.5** maps how each component of COM-B relates to the concept of values and to plural valuation. The most direct relations are that knowing about something (as Psychological Capability) is a prerequisite for valuing it, and that values affect people's preferences and beliefs (Reflective Motivation). Another important relation is that values are expressed in social and cultural norms, which in turn shape people's values (Social Opportunity). Moreover, when policies or institutions provide the physical opportunity for pro-environmental behaviour, they express the social values held or enacted by these policies and institutions.

13. Some category labels and definitions were adapted by the authors from the original behaviour change wheel such that they better align with terminology and categorizations used in biodiversity policy (e.g., Jack *et al.*, 2008; OECD, 2018; POLICYMIX, 2014). Within the intervention types, the original used the labels 'Incentivization' (now 'Rewarding') and 'Environmental Restructuring' (now 'Environmental & social restructuring'). Within the policy options, the original behaviour change wheel framework used the terms 'Fiscal measures' (now 'Economic & financial instruments'), 'Regulation' (now 'Voluntary agreements and standards') and 'Service provision' (now 'Service & knowledge provision').

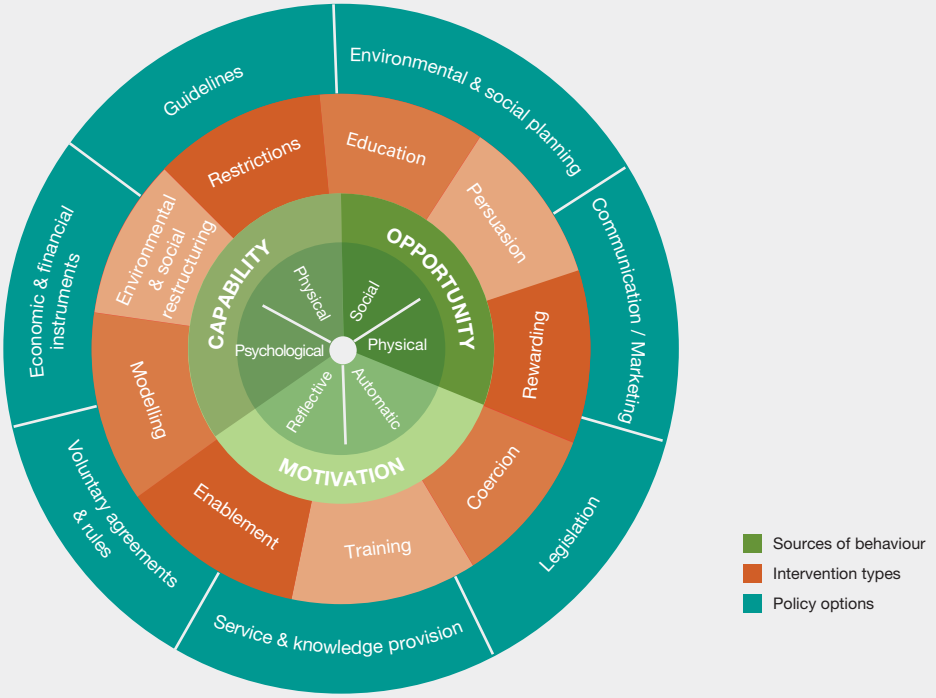


Figure 5 14 **The Behaviour Change Wheel (adapted from Michie *et al.*, 2011).**

5.3.4.2 Applying the behaviour change wheel framework to assess international biodiversity policy

The behaviour change wheel framework was applied to analyse National Biodiversity Strategies and Action Plans **(Table 5.6)**. The analysis focused on the specific actions for biodiversity conservation proposed by the action plan sections of the policy documents. A total of 1306 actions from ten National Biodiversity Strategies and Action Plans, balanced across world regions, were coded via a directed content analysis using predetermined categories (Hsieh & Shannon, 2005). We coded for the three layers of the behaviour change wheel framework (policy options, intervention types and COM-B components), and additionally whether the action specifies an individual behaviour change (i.e., conservation-related behaviour that can be undertaken at the individual level), and if it includes the group of individuals whose behaviour is being changed. The analysis enables the identification of possible gaps and missed opportunities in the actions considered by biodiversity policy. The results were linked back to the role of values and valuation. The analysis demonstrates how behavioural science can be applied directly to the evaluation and development of policy and intervention strategies for biodiversity conservation.

The results show that 83% (n=1080) of the actions specified a policy option, 48% (n=624) an intervention type, and 13% (n=168) could be related to a COM-B component. Only 11% (n=148) of the actions specified individual behaviours and 22% (n=290) mention the (group of) individuals whose behaviour is being targeted. From a behaviour change perspective an action would ideally specify all five elements. This is the case for only 3% (n=40) of the actions. In other words, only 3% of the actions proposed in the National Biodiversity Strategies and Action Plans specified whose behaviour needs to change and how, and outlined a targeted intervention to bring about that change along with a policy to deliver or reinforce it. As a first conclusion, the National Biodiversity Strategies and Action Plans generally fall short of appropriately specifying pathways for individual behaviour change for biodiversity conservation, since most actions could not be considered specific enough and would likely not change people's behaviour (PHE, 2020). Due to the nature of these higher-level policy documents, it may not come as a surprise that few of the actions are behaviour specific. Nevertheless, for policy to incorporate a behaviour change perspective and lead to actual impact on behaviour this would certainly be desirable.

Those 148 actions that specified the individual behaviours and could therefore be deemed sufficiently "behaviour-specific" from a behaviour change perspective were analysed. Behaviours related to conservation or management of natural areas and resources were the most frequently mentioned (n=47, 32%), followed by changing agricultural practices (n=29, 20%), and hunting and fishing practices (n=25, 17%).

Table 5 5 **Definitions of the COM-B components (adapted from Michie *et al.*, 2014) and their connection to values and plural valuation.**

		Definitions	Connection of COM-B to values	Connection of COM-B to "plural valuation"
Capacity	Psychological	Knowledge and capacity to engage in the necessary thought processes including memory, comprehension, and reasoning.	(Direct) knowing about why something is important is the prerequisite for valuing it.	The results of valuation can increase people's understanding of the importance of nature, increase their capability to contemplate different perspectives, and possibly overcome resistance to conservation.
	Physical	The physical ability to execute the behavior including the physical strenght, skills and stamina.	(Indirect) often skills for an activity are develooped because people value the activity or the outcomes, or because the skills are valued by society and individuals internalize these societal values.	
Opportunity	Social	Opportunity afforded by interpersonal influences, social cues and cultural norms that influence the way that we think about things.	(Indirect) collective values are manifested in societal norms and institutions. They create or enhance the social opportunity for behavior and can also shape people's individual values.	Stakeholder-inclusive valuation processes can enhance mutual understanding of people's diferent relationships with nature. This can increase the social acceptance of conservation behavior and potentially foster social norms for conservation.
	Physical	Opportunity afforded by the environment involving time, resources, locations, cues, physical 'affordance'.	(Indirect) institutions and policies reflecting on collective values often provide physical opportunities in terms of resources, infrastructure, etc.	Valuation results can justify allocation of public resources and personal efforts for conservation.
Motivation	Automatic	Emotions and impulses that arise from associative learning and/or innate dispositions.	(Indirect) values can manifest in people's habits and/or they are expressed in emotional and automatic reactions.	Including plural values of nature in campaigns, visualization, and discourses can trigger emotions and positive associations attached to conservation behavior. In the longer term, valuation processes that can foster norms of conservation can be internalized and result in automatic compliance.
	Reflective	Reflective processes involving plans (self-conscious intentions) and evaluations/beliefs about what is good and bad (i.e., values, preferences), about consequences, of an action, or about capabilities.	(Direct) values affect personal preferences and beliefs about what is good or bad, which enter deliberate reasoning and evaluation processes.	Valuation results can influence people's beliefs and motives for conservation and include them in planning and action. The impact on reflective motivation may be stronger for inclusive valuation proceses that can ensure credibility and legitimacy (in particular via participation and buy-in from those who are supposed to adapt their behavior).

Table 5 6 **Definitions and examples of behaviour change wheel intervention types and policy options.**

The examples are selected from National Biodiversity Strategies and Action Plans.

	Terms and definitions	Examples based on the actions of the NBSAPs
Intervention types	**EDUCATION** Increasing knowledge or understanding	• Prepare educational and informational materials on biosafety and agrobiodiversity • Foster continuing education for teachers in species knowledge and pedagogy in biodiversity issues • Promote the creation of educational "platforms" (e.g., clubs, workshops, temporary and permanent exhibitions) at permanet providers of informal biodiversity education, such as protected areas, museums, libraries and youth centres
	PERSUASION Using communication to induce positive or negative feelings or stimulate action	• Package and sell the economic case for the importance of biodiversity to key decision-makers • Strengthen the idea of the outdoor activities and recreation as integral to the national identity, and emphasise the positive health impacts derived from the natural environment and its recreational use • Appoint well-known local artists as 'biodiversity embassadors' to raise awareness of biodiversity values

Table 5 6

	Terms and definitions	Examples based on the actions of the NBSAPs
Intervention types	**REWARDING** Creating an expectation of additional gains or reduced cost to increase the likelihood of behavior	• Payments for environmental services • Awards scheme for best practices • Eliminate subsidies and contradictory tax incentives that are harmful to biodiversity
	COERCION Creating an expectation of punishment or cost to decrease the likelihood of behavior	• Taxes • Fines and sanctions for violations of environment protection legislation • Confiscate gear and issue appropriate fines engaging in illegal and destructive fishing practices
	TRAINING Imparting skills	• Increase the capacity of licensing and permit-issuing units through training • Train farmers in sustainable rice cultivation techniques and certification • Training in the preparation of proposals and implementation of projects financed by bilateral and multilateral donors • Training to support the development of a community water monitoring network
	RESTRICTION Using rules to reduce the opportunity to engage in a target behavior or to increase a target behavior by reducing the oopportunity to engage in competing behaviors	• Banning fishing by bottom trawling • Designating areas to be protected • Ban any GMOs whose use may have an adverse impact on biodiversity • Prohibit the import of non-native breeds of bees
	ENVIRONMENTAL OR SOCIAL RESTRUCTURING Changing the physical or social context, including institutional and governance changes	• Create, expand or connect natural habitats • Restrict damage to forestry, agriculture and transport caused by game animals through preventive measures such as fencing repellents, game bridges, subway tunnels and salt blocks • Creation of regional committees with partnerships between public, private and community sectors • Increase involvement of stakeholders-especially of local communities (with due regard to gender equality)-in the management and planning of protected areas
	MODELING Providing an example for people to aspire to or imitate	• Best practice approaches for land degraded by mining • Promote the conservation of forest biodiversity, including genetic diversity, through the development of a forest certification programme and best practice guidelines for ecosystem-based sustainable forestry • Conduct pilot projects that demonstrate sustainable grazing methods and modern approaches that help reduce grazing pressure on the forest
	ENABLEMENT Increasing means/reducing barriers to increase capability (beyond education and training) or opportunity (beyond environmental restructuring)	• Scheme for loaning cattle for nature management • Strengthen local NGOs, CBOs and local women's groups and encourage their involvement in the decision-making in and monitoring of development projects as well as in biodiversity conservation and resource-use planning • System of wood tracking to ensure timely detection of illegal logging • Develop or improve mechanisms enabling the identification and monitoring of threatened, rare or vulnerable species
Policy options	**COMMUNICATION/ MARKETING** Using print, electronic, telephonic or broadcast media	• Prepare and distribute informational materials (newsletters, brochures, newspapers, internet articles, documentaries, advertisements, banners, TV shows, etc.) • Implement a communication strategy on the economic values of biodiversity and ecosystem • Organize special biodiversity conservation events for the International Day of Biodiversity, Wetlands Day, etc. • Publish catalogues and an atlas of coastal marine biodiversity
	GUIDELINES Creating documents that recommend or instruct practice	• Develop and implement an action plan for wetlands • National Biosafety Strategy for the Management of Biological Risks • Establish government green procurement programme targets • Develop guidelines for farmers on good practices of biodiversity conservation and sustainable use
	FINANCIAL OR ECONOMIC INSTRUMENTS Measures to provide financial resources and/or monetary incentives	• Payment of Environmental Services for Conservation of Ecosystems of Strategic Interest • Identify and reform subsidies that are detrimental to biodiversity • Create efficient financial tools and mechanisms for biological diversity and natural ecosystems' conservation activities • Increase budget allocation for combating illegal logging
	VOLUNTARY AGREEMENTS OR STANDARDS Establishing rules or principles of behavior or practices based on voluntary compliance, or at least outside of a legal framework	• Partnership schemes and strategic agreements for regional development • Bilateral and multilateral agreements • Develop, monitor and enforce minimum national standards on soil, water and air quality as well as occupational health • Improve the recognition of crop and animal landraces and traditional products on the market through the development of certification schemes

Table 5 6

	Terms and definitions	Examples based on the actions of the NBSAPs
Policy options	**LEGISLATION** Making or changing laws or other forms of compulsory regulation that entail enforceable rules and obligations	• Update the Protecton of Nature Act • Command and control insturments • Strengthen permit system, regulations and implementation of Inland Fisheries Act • Develop and adopt regulations (or relevant changes therein) for participation in the preparation of biodiversity-related policies and legislation
	ENVIRONMENTAL OR SOCIAL PLANNING Designing and/or controlling the physical or social structures, including institutional and governance changes	• Metropolitan Strategic Land-Use Plan • Establish national park/protected areas/forests • Mechanisms of social and community participation in PA planning, management and creation • Register communal land
	SERVICE OR KNOWLEDGE PROVISION Delivering a service, including support services and tools or generating knowledge	• Establish a local community communication network • Database to register school environmental projects • National Biodiversity and Ecosystem Services Monitoring System • Develop geo-spatial tool to identify key biodiversity areas
		PA: Protected area GMO: Genetic Modified Organism NGO: Non-governmental Organisation CBO: Community Based Organisation

Table 5 7 **Types of individual behaviours targeted, frequency and examples found in the action plans of the ten National Biodiversity Strategies and Action Plans.**

Behaviour type	Share in %	Examples of individual behaviours identified in the actions of the National Biodiversity Strategies and Action Plans
Conservation actions and management of natural resources	32%	Restoration of degraded areas, management of protected areas and income-generating opportunities therefrom, reduce conflicts between forms of land use, mitigate/eradicate marine eutrophication, monitoring and management in Ramsar sites and wetlands, water quality monitoring, monitor and manage the risks associated with the handling, transport, use, transfer and release of living modified organisms, fighting invasive species, control the import of non-native bees, control of giant hogweed and keeping raccoon dogs, fire use.
Agricultural practices	20%	Restore/create shelter beds, adjust crop rotation, fertilization and anti-erosion protection systems, minimize the use of agrochemicals, increased adoption of conservation agriculture, organic agriculture and other climate resilient forms of agriculture, small scale drip irrigation, increase the cultivation/animal distribution of indigenous livestock breeds and drought-adapted crop cultivars.
Hunting and fishing	17%	Regulations, increase control and reporting of wildlife crime and offenses.
Participation in public deliberation processes and environmental engagement	16%	Increase local participation in decisions related to biodiversity conservation and use, involvement in monitoring of development projects as well as in biodiversity conservation and resource-use management and planning, regional information sharing on biosafety issues, increase participation of indigenous peoples and local communities in the generation and addition of value, and exports of products derived from native biodiversity, increase the ability to find funding for biodiversity conservation activities, participation in decision-making processes on genetically modified organism-related issues.
Consumption behaviours	5%	Conservation of water in urban consumption, commercial use of non-timber plant resources, use low pollutant emitting technologies, control over waste pollution, strengthen community biodiversity-based enterprises, adoption of the "reduce, reuse and recycle" principle.
Educational practices	5%	Increase species knowledge and pedagogy in biodiversity issues, include biodiversity issues in educational activities for different age groups.
Research practices	3%	Increase research on biodiversity issues, data collection, management and analysis.
Recreational activities and voluntary work	3%	Cycling, outdoor activities and recreation, management of holiday cottage gardens, voluntary work in a nature centre or a café at a nature reserve, mowing hay meadows, help in nature management and communication tasks.

Therefore 79% of the individual behaviour actions are aligned with tackling the direct drivers of biodiversity loss. **Table 5.7** below illustrates the types of individual behaviours the National Biodiversity Strategies and Action Plans identified and addressed in their action plans. From these percentages, it seems noteworthy that the individual behaviours addressed by National Biodiversity Strategies and Action Plans also relate to indirect drivers of biodiversity loss such as production and consumption patterns of the mainstream economic system and a western lifestyle. This is important because for transformative change typically those are said to require most changes (Chan *et al.*, 2020).

Figure 5.15 shows the policy options, intervention types, and COM-B components proposed for the 148 actions that specified individual behaviours. It is important to highlight that one action could propose more than one policy option, intervention type and COM-B component. The *policy options* aimed at supporting the individual behaviour change interventions were largely focused on service and knowledge provision (34%, n=50), legislation (16%, n=23) and environmental and social planning (14%, n=21). The policy options of communication and marketing (4%, n=6) and financial instruments (3%, n=4) were least frequently mentioned. The most frequently

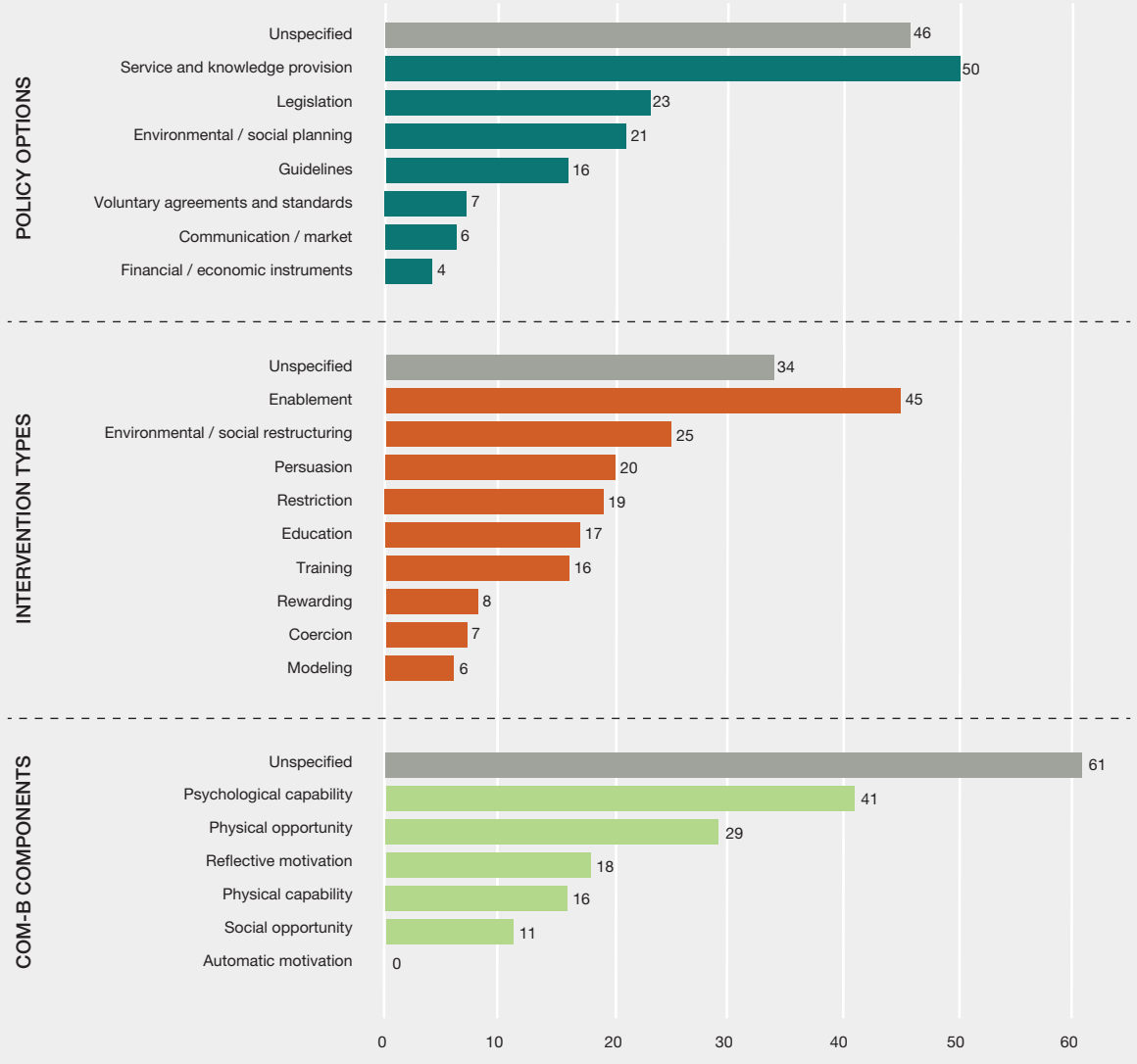


Figure 5 15 **Frequency of the policy option, intervention types and COM-B components associated with the actions that specified individual behaviour change identified in the ten National Biodiversity Strategies and Action Plans; relative frequencies in percentage of the total number of actions (n=148).**

Note that an action can address more than one policy option, intervention type, or COM-B component.

coded *intervention types* for changing individual behaviour were: enablement (30%, n=45), environmental and social restructuring (17%, n=25) and persuasion (14%, n=20). Intervention types of rewarding (5%), coercion (5%) and modelling (4%) were mentioned least often. Only about half of the individual behaviour-specific actions (n=87, 59%) could be coded for how they would influence behaviour along COM-B components. Most of these actions focus on enhancing "psychological capability" (28%, n=41), followed by "physical opportunity" (20%, n=29), "reflective motivation" (12%, n=18) and "physical capability" (11%, n=16).

These results are interpreted in light of the wider literature on behaviour-based policies and transformative change. The "behaviour specific" actions align with the recommendations in the literature in so far as they reveal an emphasis on service and knowledge provision (at policy level) and enablement (at intervention level). Our coding of enablement included providing information, tools, and resources, supporting researchers, and promoting voluntary work or other engagement in nature protection **(Figure 5.15)**. At the level of COM-B components, these interventions link to the most frequent categories of psychological capability (mainly via information provision) and physical opportunity (via provision of resources and social structures). The aspect of creating social spaces is also in line with the relatively strong occurrence of actions that propose social planning (at policy level) and social restructuring (at intervention level). All this reflects the need for enabling conditions propagated in the transformation literature, such as provision of information flows and access to information (conceptualized as deep leverage points within the design level in Meadows, 1999), promotion of resources and distributional justice (Milchram *et al.*, 2019), leveraging human-nature relationships (Abson *et al.*, 2016; Martinez-Harms *et al.*, 2018), and fostering safe spaces where conflicting viewpoints can be turned into a fertile ground for innovation and enable people to act upon their existing values for nature (Temper *et al.*, 2018; Vinnari & Laine, 2017).

In contrast to findings in the academic literature, our analysis reveals that behaviour-specific actions understate the potential of increasing people's motivation as a pathway to support transformative change. Rare and The Behavioural Insights Team (2019) advocate interventions that generate positive emotions for conservation. This relates to the COM-B components of "automatic motivation", which was not made explicit in any of the actions of the National Biodiversity Strategies and Action Plans. Similarly, relatively few actions in the ten national biodiversity strategies propose to influence "reflective motivation" through the provision of incentives, either in form of rewards or coercion. Although the interactions between external motivation from material incentives and pre-existing values remain controversial (Rode *et al.*, 2015, see also Chapter 4), the need to change the incentive systems in order to better account for the diverse values of nature is widely recognized (Dasgupta, 2021). Cultivating pre-existent values may be done through mechanisms that reward and validate "endogenous" values, and mitigate the influence of "exogenous" value systems, especially its impact on farmers' self-esteem (Horcea-Milcu *et al.*, 2016, 2018). Finally, the low frequency of the "social opportunity" category also understates the importance of cultural and social norms for shaping behaviour.

To conclude, the analysis of National Biodiversity Strategies and Action Plans actions from the behaviour change perspective showed that those actions do not sufficiently specify the elements required for effective behaviour change and that they often lack a clear understanding of the mechanisms by which interventions can drive biodiversity-related behaviours, including through working with individual and social values. For those actions that are sufficiently behaviour-specific, interventions mainly address information and resource provision as enabling conditions, but underrepresent the potential behavioural impact of addressing people's motivations (including their values) and their social environment.

5.3.5 Summary findings: working with values to galvanise transformations to sustainability

Working with values is relevant to a range of intervention points for leveraging transformative change. Working with values in the practical sphere of production, consumption and exchange involves more diverse and inclusive valuation of nature as well as the uptake of valuation in practical interventions such as incentives for pro-environmental behaviour. Working with values in the structural sphere of institutions, policy and governance involves changes in the design of society that enable more diverse values (including sustainability-aligned values) to be articulated and acted upon. For example, laws that articulate the rights of nature and thus help enable indigenous peoples, amongst others, to operationalise values of care for nature. Working with values in the personal and cultural sphere involves shifting and enabling beliefs and worldviews in ways that can drive changes in other spheres and that can shift the high-level goals of society. For example, evolving beliefs about what constitutes human flourishing, and what relationships with nature are consistent with wellbeing, might shift societal goals from consumption growth towards sufficiency for *Buen vivir.* All these ways of working with values must take place in the context of asymmetries of power and will require political interventions to empower citizens and to prevent resistance from incumbent powers whose interests may not be aligned with sustainability (Geels, 2014). It is for this reason that reconfigurations of power are frequently

found to be fundamental to achieving transformative change (Patterson *et al.*, 2017).

There is agreement in the literature that values are important in relation to sustainability and sustainability transformation. A subset of this literature can be described as action-oriented and deals with ways to engage with diverse values as leverage points for moving socio-environmental systems towards sustainability. Ways to deliberately mobilize sustainability-aligned values typically include processes that enable expression and enactment of values by changing societal contexts. Ways to engage with non-sustainability-oriented values are referred to as shifting values. Working towards a shared vision for transformation towards just and sustainable futures may require a mix of top-down (e.g., policy interventions) and bottom-up ways of working with values such as citizen empowerment, co-production and reflexive learning. In both cases, including mechanisms to correct for power asymmetries when designing interventions or co-designing processes is essential.

Holding sustainability-aligned values is important, but not sufficient for pro-environmental behaviour, due to the multiplicity of influences that affect behaviour. Sustainability-aligned values may conflict with other values working against conservation. Equally, formal and informal institutions can constrain personal freedoms to act in accordance with values. These issues lead to the frequently observed phenomenon of a "value-action gap". Interventions can be structured in such a way as to reduce this gap and enable pro-conservation behaviour. These can include: actions to increase people's motivation to engage in pro-conservation behaviour; actions to shape people's understanding of pro-conservation behaviours and to help them to develop the required skills (capability); and actions to reduce the material and social obstacles to performing pro-conservation behaviours or to increase the costs of behaviours that harm conservation (opportunity). Biodiversity policy strategies and action plans for conservation would benefit from more attention to this behavioural science framework, and being more explicit about how policy can be directed at enabling pro-conservation behaviour.

5.4 GOVERNING THE MOBILIZATION OF DIVERSE VALUES FOR CHANGE

5.4.1 Governance and values

Governance definitions and frameworks are normative and carriers of values and value systems, with some embracing consensus and empathy, others entrepreneurship and other authority and control (Meuleman, 2019). Governance forms and arrangements are a reflection of how people value others' value. The notion of governance also to some extent has a normative dimension, especially given the fundamental assumption that good governance is important for quality of life of citizens, and important for the success of states, civil society, corporates and other entities in their functioning (Fennell *et al.*, 2008; Peters, 2012).

In governance science and practice, the role of values is often obscure and hidden, despite underpinning decisions, and inspiring the worldviews of those who govern. In an era of rapid environmental change and uncertainty and increased recognition of coupling of social and ecological systems (Frantzeskaki *et al.*, 2010; Schoon & van der Leeuw, 2015), there is widespread realization of limitations of technocratic, top-down, hierarchical governance and management approaches which seek to control key ecosystem variables in order to achieve efficiency, reliability and optimality of ecosystem benefits (Holling & Meffe, 1996). Scholars working on commons have laid the ground of community-based conservation, indicating a shift from expert-based approaches to participatory management approaches, and seeking to balance conservation goals with socio-economic goals (Gruber, 2010), particularly when faced with wicked problems (Berkes, 2004). The work on commons has been influential in setting an institutional crafting framework, especially by laying down design principles for stable community property resources (Ostrom, 1992) and providing frameworks for analysing institutional change (Ostrom & Basurto, 2011). The institutional bricolage scholarship, on the other hand, contests the amenability of local institutions to design, and instead focuses on the socially informed analysis of contents and effects of institutional arrangements (Cleaver & De Koning, 2012; Cleaver & Whaley, 2018). This scholarship stresses that institutions adapt through processes of bricolage, by assembling institutional components from different origins functions, and working and enduring if they are seen as legitimate and meaningful (Cleaver, 2002).

The significance of values in underpinning and shaping governance choices is a central idea for an interactive governance perspective, which focuses on interactions between governance actors (social agencies possessing agency or power of action) and structures (frameworks

within which actors operate), as a key determinant of governability (overall capacity of governance) of the social entity or system (Kooiman *et al.*, 2008). Values, together with images and principles form the deep-ingrained "meta-level" governance elements of those involved in governing, and explain much of differences in governance outcomes, especially their capability to deal with "wicked problems" (Kooiman & Jentoft, 2009; Meuleman, 2019) while navigating towards just and sustainable futures.

This section aims to unravel the role of diverse values and plural valuation in triggering governance transformation towards just and sustainable futures, and the possibility of values being used as leverage points. The assessment focuses on following five questions:

- What is the case for inclusion of diverse values and plural valuation in decision-making processes and governance arrangements?
- What governance arrangements enable the incorporation of diverse values for the creation of just and sustainable futures (or are better aligned with just and sustainable futures)?
- What adaptations in governance may be required for mobilization of diverse values? What are the constraints and opportunities?
- What is the role of capacity development, adaptive learning and experimentation in the incorporation of diverse values for just and sustainable futures? How can it be promoted?
- Is adaptation in governance enough, or do governance systems need to transform for mobilization of diverse values?

5.4.2 Governance forms and arrangements for incorporation of diverse values in just and sustainable futures

The diversity, dynamics and complexity of societal situations in which collective decision-making is done, encapsulating politics, policy and policy dimensions is captured in the discussions around governance forms and arrangements, also referred as governance modes (Pahl-Wostl, 2015; Treib *et al.*, 2007). Various categorizations of governance modes have been suggested, differentiated in terms of idealized forms (hierarchies, markets and networks) (Thompson, 2003), locus on state intervention to societal autonomy continuum (Treib *et al.*, 2007), or on the role of governmental and non-governmental actors occurring in combinations of hierarchical, self and co-governance modes (Kooiman, 2000). In each of these modes, actors acquire power through different processes, for example, in a hierarchical order power is conferred through formal processes, in a network depending on centrality of actor's role, and in a market on the basis of economic resources (Pahl-Wostl, 2015) (Chapter 4).

Different governance modes are built around the ways in which people consider other peoples' values (Meuleman, 2013). Hierarchical values and principles typically include rationality, reliability, risk averseness, and managing by instructions. Values forming the basis of network governance may include partnerships, collaborative learning, co-creation for innovation, or a mutual gains approach, amongst others. Similarly, market governance may be underpinned by values such as rationality, cost-driven decisions, flexibility, competition as drivers for innovation, innovation, and self-determination (Meuleman, 2019). Governance modes differ in the ways in which these encapsulate values such as: hegemony (one's values considered as superior to others); separatism (not willing to be confronted with the implications of other people's values); pluralism (being co-responsible for protecting other people's values); tolerance (being sympathetic to other people's values despite knowing that one's values are superior) and indifference (abstaining from intervention due to lack of interest in other's values; Meuleman, 2013). Hierarchical modes of governance are usually linked with values of hegemony, network governance models are usually linked with pluralism and tolerance and market governance models are usually linked to indifference. The relationship of governance and values can thus be seen as: a) values as determinants of governance, and b) governance framing values by institutionalising decision-making structures and creating power sharing arrangements. It is also argued that governance for nature and nature´s contributions to people is partly ingrained in how people consider other's values – thus calling for broadening values and valuation discourse.

This brings us to the question – what governance modes are suited for transition to just and sustainable futures and what values underpin such governance modes? Discussions on governance for sustainability indicate that value choices – on the nature of society we want to live in and want to leave for posterity are the lynchpins of societal steering decisions, navigating within the realm of fragmented power across many actors and societal subsystems (Meadowcroft, 2007). Available evidence points out to characteristics of modes of governance that are suited in such complex polycentric context: a) interactive (consciously interacting with power centres to define as well as realize goals) and reflective (to reassess practices and adjust steering mechanism) (Frantzeskaki *et al.*, 2012; Meadowcroft, 2007); b) reflexivity in steering strategies, calling into question the governance foundations and envisioning

alternatives and reinventing and shaping the foundations (Voß & Bornemann, 2011); and c) supported by democratic institutions, participation and policy coherence (Glass & Newig, 2019; Meuleman & Niestroy, 2015). From a meta-governance perspective, the value principles of respect (for self-governance mode), equity (for hierarchical mode), and inclusion (for co-governance mode) may be aligned to such conditions (Kooiman & Jentoft, 2009). The decision-making and choices can become "easy", "moderate" or "hard" due to (in)compatibility, (in)comparability, or (in) commensurability of values (Kooiman & Jentoft, 2009), thus highlighting the significance of meta-governance in setting the values, images and principles as the backdrop to transition towards just and sustainable futures. Furthermore, incommensurable values, or conflicting and incompatible images and principles may underpin persistence of "wicked environmental problems" as has been observed in the case of governance of water (Pahl-Wostl *et al.*, 2007a; Weitz *et al.*, 2017), marine fisheries (Song *et al.*, 2013), ecosystem management (DeFries & Nagendra, 2017), and others.

Governance for sustainability has to cope with fundamental uncertainty and possibility of unintended consequences (Voß *et al.*, 2007) due to several factors such as complex interactions between society, technology and nature (Clark *et al.*, 2016), and prevalence of uncertain knowledge (Grunwald, 2007). There is a need, therefore, to champion new approaches that are both flexible enough to address highly contextualized socio ecological systems and dynamic and responsive enough to adjust to complex, unpredictable feedback between social and ecological system components (Chaffin *et al.*, 2014). The value of adaptive governance has been emphasized in these contexts, allowing for policies to be implemented as systematic experiments which are analysed for unanticipated outcomes, and lessons fed back into governance and decision-making processes (Chaffin *et al.*, 2014). Adaptive governance enables connections at multiple governance levels, often self-organizing as social networks drawing on multiple knowledge systems and experiences for development of common understanding of decision-making situations (Folke *et al.*, 2005). The capability of governance regimes to address uncertainty and complexity is also built by facilitating creation of spaces that allow for anticipation of co-evolutionary interdependence (Sachs *et al.*, 2019) for transformations to achieve SDGs and enhance the reflexivity of actors with respect to their embedding in broader system contexts and dynamics (Klinke & Renn, 2012; Voß & Bornemann, 2011). Coordination and stakeholder integration are critical ingredients of governance systems to be adaptive and anticipative in the face of complexity and uncertainty (Boyd *et al.*, 2015).

The need for enhancing fit between ecosystems and governance systems within adaptive governance has been emphasized in the literature, stressing three core connectors, namely, *leadership* by individual actors, using *networks* to coordinate actors across a multilevel governance system, and activating *social memory* stored in such networks (Olsson *et al.*, 2006). The effectiveness of institutions often depends not only on their own features, but also on the interactions between institutions, often beyond their domains (Young, 2005; Young & Underdal, 2004). These interactions, however, can be synergistic or cause disruptions within the organizations (as has been seen in the case of climate governance in particular). Interactions can be horizontal (occurring amongst institutions at the same level of social organization or at the same administrative scale) or vertical (influencing interactions at multiple administrative levels). Broadly, four causal mechanisms are known to influence the interplay between institutions. These are: cognitive interaction, interaction through commitment, behavioural interaction or impact level interaction (Gehring, 2006; Gehring & Oberthür, 2008).

From the values perspectives, governance modes which are flexible, transparent, and promote collaboration, participation, and learning underpin their capability to address complexity and uncertainty. In certain situations, hybrid forms of governance (such as co-management, or partnerships between state and non-state actors) may help address uncertainty, although risks of window dressing in absence of consideration of diverse values and different ethical perspectives remain (Fennell *et al.*, 2008).

The complexity of conservation problems that are faced today require institutions and governance arrangements that can span boundaries and scales that can help bridge the science-action gap and enable production of actionable knowledge that can create outcomes of public value (Gerber & Raik, 2018; Wright *et al.*, 2020). Different stakeholders act upon different values at different spatial, temporal and organizational scales, which in turn is, *inter alia*, influenced by power relations (Chaffin *et al.*, 2016; Cosens & Williams, 2012; Folke *et al.*, 2005; Loorbach *et al.*, 2017; Pahl-Wostl, 2015). Bridging organizations have also been identified as playing a critical role in transformation, by providing opportunities through bringing in new knowledge, resources and incentives for managing the environment (Brown, 1991). These organizations also tend to encompass the function of boundary organizations which assist in communicating, translating, and mediating various knowledge systems, making it relevant for policy and action (Stewart & Tyler, 2019). The role of boundary organizations in bridging science-policy divide and facilitating knowledge integration at multiple scales, and addressing value trade-offs has been found important in the case of marine protected areas (Gray *et al.*, 2016), landscape conservation in the Caribbean (Jacobs *et al.*, 2016), climate change adaptation planning at municipal levels (Graham & Mitchell, 2016), or to international processes such as IPCC on addressing science-policy interface in climate change agenda setting (Gustafsson & Lidskog, 2018).

5.4.3 Transformative governance and diverse values

Repeated calls have been made for transformative governance of biodiversity in order to stem the ongoing decline and degradation (Visseren-Hamakers *et al.*, 2021). According to Chaffin *et al.* (2016, p. 403) *'what defines a true transformation is when the regime shift experienced is a direct result of human vision, planning, and action, in other words, human agency'.* In this way, transformation in socio-ecological systems – as a result of a human-driven process – implies alternative governance models that are prone to promote non-linear change in complex socio ecological systems and that has the capacity to respond, manage, and trigger regime shifts in coupled socio ecological systems at multiple scales (Chaffin *et al.*, 2016).

The goal of transformative governance is to actively shift a socio ecological system to a fundamentally different and more desirable regime by altering the actor organization, institutional arrangements, processes and thereby reorganizing the governance mechanisms of the socio ecological systems. The process to achieve such a goal often requires triggering radical, systemic shifts in values and beliefs; patterns of social behaviour; multilevel governance and management regimes by disrupting dominant entrenched forms of environmental governance and providing space for innovation and framing and setting new agendas (Chaffin *et al.*, 2016).

Transformative governance, hence, relies on (i) values that guide action towards transformation and that are embedded in the selected methods and means of governance (design); and on (ii) values embraced by goals, expectations, and societal priorities of the envisioned new system. Considering transformative governance aims at just and sustainable new systems, which means it is inclusive of diverse values (intent), and that a multiplicity of values is needed in the processes (design) of governance for such transition.

Since current societies are based on an unsustainable organizational (Chaffin *et al.*, 2016) design and *'the rapid trajectory of global change is likely outpacing societal abilities to preserve desirable regimes in many socio ecological systems nested within a global system'* (Chaffin *et al.*, 2016, p. 405), adaptation alone is unlikely enough to achieve a just and sustainable future. Chaffin *et al.* (2016, p. 405) argues that *'there is a further need for models of environmental governance that actively encourage and permit the transformation of current resource-use patterns to create sustainable socio ecological systems at nested scales across the globe'.* Transformative governance is needed when (a) socio ecological systems conditions have become untenable, the system is rapidly approaching a threshold with unknown or undesirable consequences, and the mechanisms of adaptive governance are insufficient to maintain desired conditions; (b) a socio ecological system has crossed a threshold and undergone a regime shift that has altered the socio ecological system to a point of degradation that is no longer desirable to society; or (c) the socio ecological system has developed in such a way that ecosystem services are produced at a low rate and social inequities are high, and more desirable system state with greater production of services and less injustice is envisioned and possible (Chaffin *et al.*, 2016).

Some characteristics of governance models can promote or prevent systems adaptation and transformation to happen. **Table 5.8** presents opportunities and constraints to enable transformative governance that are interrelated and described below in the light of considering diverse values into governance structures to achieve envisioned systems.

Leaders champion critical narratives – that represent certain worldviews and values – to mobilize, arrange, and sustain the necessary social and political capital for change. In order to promote change that considers diverse values and aims for a just and sustainable new system, it is important that multiple sources and different agents and networks act as

Table 5 8 **Opportunities and constraints for transformative governance (Adapted from: Abson *et al.*, 2017; Chaffin *et al.*, 2014, 2016; Olsson *et al.*, 2014).**

Opportunities	Constraints
• Nested leadership • Functioning social networks • Increased and effective public participation • Create space and autonomy for local experiences • Experimentation, reflectiveness and adaptation • Knowledge co-creation • Crises as powerful narratives for change • Flexible institutions • People value nature	• Cognitive limits of humans • Market oriented norms • Inertia of embedded political power relations • Hierarchical governance structures • Upscaling • Long-term and intensive involvement

leaders. Thus, to lever transformation, the governance shall promote the leadership of nested institutions (complex, redundant, and layered) and institutional diversity (a mix of public, private and civil society actors) at the local, regional, and state levels, connected by formal and informal social networks (Chaffin *et al.*, 2014; Dietz *et al.*, 2003). Leaders from indigenous and local communities support the integration of these groups' values and knowledge into governance processes.

Functioning social networks connect individuals and organizations across multiple levels and scales and strengthen the capacity for legitimated participation in decision-making (Chaffin *et al.*, 2014; Folke *et al.*, 2005; Olsson *et al.*, 2006). Networks that comprise diversity are important instruments to empower diverse values into making decisions towards a more inclusive system. Hence, key elements of transformative governance involve fostering, supporting and giving space to social networks, both formal and informal ones. While informal networks are helpful, especially at early stages of transformation, to foster governance experiments at small scales; formal institutions, mainly at later stages of transformation, have the overarching capacity to plan for multiple potential futures in the face of uncertainty and support an effort to force or respond to a regime shift (Chaffin *et al.*, 2016).

Therefore, central to the consideration of diverse values in the transformative governance is a multi-actor approach that widens the scope of participation to a broad set of values and beliefs within society and that guarantee effective participation of the involved ones. A key aspect is the inclusion of non-state actors in participatory approaches for governance, with special attention to aspects such as power inequality (Abson *et al.*, 2016).

Governance for transformation also involves creating space and autonomy for local experiences ("niches") and encourage innovative interventions and the emergence of arrangements inclusive of diverse values within systems. This is exemplified by a growing number of bottom-up approaches to governance, many of them with aspects of self-organization, that have emerged via groups of local actors, social networks, and various collaborations of community leaders looking for alternatives to top-down government and decision-making (Chaffin *et al.*, 2014). In this regard, trust building among stakeholders at the local level, the participation of a diverse array of stakeholders and leadership are essential (Chaffin *et al.*, 2014; Folke *et al.*, 2005; Olsson *et al.*, 2006).

Experimentation, reflectiveness and adaptation play a fundamental role in promoting change, given the uncertainties associated with rapid and global environmental change. Governance arrangements, thus, would benefit from being open to questioning existing values, knowledge and structures. Also, it would benefit from giving opportunity to experimentation of new ways of governance bringing up non-dominant perspectives and values, and novel and adaptive models, to manifest a transformation. In this regard, decision-making can be viewed as the exercise of implementing multiple technical, social and organizational options (Karpouzoglou *et al.*, 2016). Intrinsically to the experimentation process, the act of continuously reflecting on what has been done and learnt – as new information comes and knowledge is built through interactions of multiple actors -, may allow insights to adaptations and improvements of institutional functioning, which can, in turn, lead to systemic transformations (Cundill *et al.*, 2014). Institutionalizing such mechanisms in governance (IPBES, 2016b, 2018a, 2018b, 2018c, 2018d, 2019; Newig *et al.*, 2016; Ramsar Convention on Wetlands, 2018; UNCCD, 2017; WWAP & UNESCO, 2019) promotes a "learning by doing" process and leverage transformative change (Abson *et al.*, 2016). Decentralized and informal processes are more prompt and able to experiment, adapt and deal with socio ecological systems dynamics.

Therefore, learning and knowledge are essential to the transformation. In the same way, adequate information about resources (ecological), values (social), human-environment interactions and up-to-date information on uncertainty are enablers of transformative governance (Dietz *et al.*, 2003; van der Molen, 2018). If governance arrangements are based on past information and consolidated knowledge structures, it is less likely it will design options different from the business-as-usual trajectory. The governance for transformation, thus, needs to acknowledge the values and worldviews embedded in knowledge production that inform various societal conceptualizations of socio-ecological systems, as well as the importance of determining whose values define a desirable regime. This aligns with the call for rethinking knowledge production, flow and use through systems of interest (Abson *et al.*, 2016), which leads to knowledge co-creation and social learning processes. Socio-ecological system issues are too complex to be managed by a single entity and leads to the need to integrate and legitimize different types of knowledge, from different actors, worldviews and values systems. From social learning processes new knowledge and joint solutions emerge, leading to changes in practice (Kristjanson *et al.*, 2013). Moreover, knowledge is argued to constitute and imply power, as the exercise of power in a governance context necessarily involves knowing (van der Molen, 2018). The co-creation of knowledge from diverse values systems is one form of empowerment of the diversity of actors involved.

Moreover, crises can be powerful narratives for change as they can represent a pressure to reflect, reorganize, learn, adapt and trigger values and behaviours change, both

at individual and institutional level. At institutional level, a key lever then lies in ensuring institutions are designed to be flexible and open to the potentially transformational learning and adaptation opportunities invoked by crises (Eburn & Dovers, 2015). At an individual level, how people perceive, value and interact with nature influences environmental values and behaviours and shapes the goals and paradigms underpinning human action and may influence the design of socio-ecological systems (Abson *et al.*, 2016). Therefore, it might work as a lever encouraging governance modes to acknowledge humanity's reliance on the natural world and require valuating and strengthening material and immaterial links between people and nature in local ecosystems in decision-making processes (Abson *et al.*, 2016).

In contrast to the mentioned factors above, the following factors are constraints, barriers and challenges that prevent transformative governance from occurring. Addressing them appropriately is paramount to creating conditions for transformative governance.

Humans often lack the innate ability to question dominant socio-structuring paradigms and conceptualize ideas beyond the physical senses (cognitive limits of humans; Chaffin *et al.*, 2016), which means there are constraints for going beyond established worldviews and values and the dominant values tend to be maintained. The actual dominant world economic system is capitalism. As, in some cases, transformation of socio-ecological systems may go against market-oriented values and norms and dominant political systems, such transformation can represent a great challenge. The nested nature of socio-ecological systems is likely to require a restructuring of local economies, self-organization and decision-making autonomy related to natural resources use and conservation (Abson *et al.*, 2016; Chaffin *et al.*, 2016).

Likewise, disrupting the inertia of embedded political power relations that govern most contexts is challenging as dominant power relations can keep the system resilient to change from an unsustainable trajectory. Difficulties in coordinating among institutions are considered a major barrier for operationalization of governance to change (Karpouzoglou *et al.*, 2016). Exposing the limitations of deeply entrenched power relations can illuminate pathways for transformation. In this sense, hierarchical governance structures put decision-making far from the actual contexts where decisions are made, resulting in decisions that may not be comprehensive of the diverse values of natural resources users and leaving behind innovative ideas lost in the information flow between levels of the hierarchy. On the top of such pyramidal structures there are few responsible for decision-making, usually with a recurrent profile, meaning low diversity of values represented (Abson *et al.*, 2016).

While small scale experiences of transformation have enhanced the emergence of new governance models in some cases, the scale at which paradigmatic shifts in societal values, beliefs, vision, and ideology are necessary to legitimise transformative governance is likely to be much greater. The capacity of transformative governance to gain scale is restricted. Understanding and providing catalysts and mechanisms for nested personal and social transformations at the collective scale and scale the socio-ecological system as a function of collective skills, relationships, institutions, and network structures are key components of governance for change.

Lastly, in order to promote a transformative governance considering the plurality of values, there is the challenge of long-term and intensive involvement of various groups of actors with diverging values and interests to sustaining flexible, adaptive and dynamic governance arrangements (van der Molen, 2018).

5.4.4 Social learning in governance for just and sustainable futures

The promotion of social learning processes is crucial for governance systems that intend to contribute to the creation of just and sustainable futures. Social learning refers to changes in understanding that are generated through interactions within social networks, going beyond the individual to affect wider social units or communities of practice (Reed *et al.*, 2010). Along with social learning, the coproduction of knowledge and knowledge dissemination contribute to initiate change, to build, and to sustain the system's adaptive capacities (Karpouzoglou *et al.*, 2016; Pahl-Wostl *et al.*, 2007b; van der Molen, 2018), providing a continuous flow of information to coordinate decisions and actions across scales (Cosens & Williams, 2012; Folke *et al.*, 2005). Since social learning is based on cycles of reflection and action (Fisher *et al.*, 2016; Freire, 2000), knowledge co-production and joint analysis can lead to collective decisions, implementation, and change, which in turn lead to new cycles of evaluation, reflection and action (Kristjanson *et al.*, 2013), thus contributing to governance systems with effective participation and well informed decisions.

Fostering a culture of learning through processes of participatory reflexion, decision and action implementation as well as collaborative production of knowledge across different social actors, groups and networks contribute to the recognition, mobilization, weaving, integration and co-creation of diverse values. Social learning for just and sustainable futures can thus be understood as a process through which public, private and civil society actors learn with, from and for each other's values of nature, through the recognition and incorporation of diversity as an underpinning

value that links justice and sustainability. The recognition and incorporation of diverse values in governance depend on each system's culture of learning and integrative capacities. These capacities generally involve: (i) processes of plural valuation linked to negotiation and decision-making outcomes (Zafra-Calvo *et al.*, 2020), (ii) the integration of various types of knowledge in governance, for instance, by joint knowledge creation processes in which various actors *'cooperate in the exchange, production and application of knowledge'* (Hegger *et al.*, 2012, p. 53); (iii) explicating and reflecting on the often implicit *'normative frames of reference'* that actors with various backgrounds have (van Buuren, 2009, p. 215); and (iv) identification and awareness of *'the different epistemological beliefs which underpin knowledge claims'*, such as beliefs concerning *'the validity and reliability of different knowledge claims'* (Raymond *et al.*, 2010, p. 1775).

Learning with, from and for diverse values of nature that are held by indigenous peoples and local communities can support governance for just and sustainable futures since IPLC have key long-term place-based knowledge and values of biodiversity (Benedict, 2019; Inuit Circumpolar Council Alaska, 2015, 2018). In this sense, policies on environmental planning, management and conservation significantly benefit from the inclusion of ILK. Moreover, creating opportunities for dialogue and direct learning among different social groups can help prevent and resolve conflicts related to environmental injustice (see 2.2.2, 2.2.3) as well as promote inclusive and participatory decision-making through the recognition, mobilization, weaving, integration and co-creation of diverse values.

Situated learning processes based on the inclusion of multiple social actors face a number of challenges and opportunities, which can be addressed by the consideration of different constraints and enablers.

Barriers to learning processes based on the inclusion of diverse values for just and sustainable futures

Unbalanced power relations represent an important barrier of learning processes that include diverse values (Rodríguez Aboytes & Barth, 2020). They can limit access to information, constraining opportunities for participation of certain actors (Rodríguez Aboytes & Barth, 2020). Power relations between participants may constrain participation and learning from diversity in various ways. For example, open dialogue may aggravate conflicts in governance processes or reinforce dominances inhibiting the participation of other participants. Fundamental differences between values and beliefs that become controversial present constraints for learning (Gerlak *et al.*, 2020); it is thus important to be able to transform conflicts into learning opportunities and possibilities for negotiation. Multi-stakeholder collaboration and participatory processes may prevent or transform conflicts that are rooted in value pluralism.

Another constraint is the availability and mobilization of sufficient resources and capacities to sustain venues that facilitate learning between diverse social actors (Gerlak *et al.*, 2020). As the processes of collaboration and dialogue in decision-making require time, the conditions to do so are not always there, nor the possibilities to hire professional facilitation services. Network governance structures may thus be overly centralized inhibiting necessary information flows for a diverse input and deeper learning levels, or overly decentralized increasing transaction costs of the learning process while facilitating a broader engagement and shared learning (Gerlak *et al.*, 2020). Multi-level network structures may mitigate both dilemmas allowing decentralized networks connected by shared goals, rules and actors; promoting learning across diverse social actors (Gerlak *et al.*, 2020).

Enablers of learning processes based on the inclusion of diverse values for just and sustainable futures

Systematic literature reviews on learning in environmental governance (Crona & Parker, 2012; Gerlak *et al.*, 2017, 2020) and transformative learning (Rodríguez Aboytes & Barth, 2020), complemented by literature on diverse values (Dendoncker *et al.*, 2018; Zafra-Calvo *et al.*, 2020) indicates the following enablers of learning processes that promote the inclusion of diverse values for just and sustainable futures.

Co-production of knowledge

Knowledge co-production has been shown to be a key process to enable learning and adaptation as participants learn to learn through diverse values, knowledge systems, modes of communication, deliberation and social interaction, as well as the uncertainty of social and environmental changes (Armitage *et al.*, 2011; Davidson-Hunt, 2006; Merçon *et al.*, 2018; Tengö *et al.*, 2014). It is important to consider knowledge co-production as a social and political process that often reproduces and even reinforces inequality and exclusion. Effective learning with, from and for diverse values can be enabled by processes of joint knowledge creation that allow for differences to be highlighted and interests to be contested (Turnhout *et al.*, 2020). Knowledge co-production can thus be documented and analysed in order to better understand the mechanism by which such processes foster learning, balanced power relations and effective governance adaptation and change (Akpo *et al.*, 2015).

Including learning from plural actors as an explicit objective

Collaboration and plural participation in environmental governance are essential for learning processes that promote sustainable and just futures (Zafra-Calvo *et al.*, 2020). To better ensure that learning with, from and for diverse values occurs, it is important to include it as an explicit objective of the process of transformative environmental governance (Gerlak *et al.*, 2017). As learning is a very subjective and internal process, it is recommended that its role be visualized as well as the intangible achievements of dialogue and collaboration. The recognition of the limits of our knowledge and the importance of listening to the diversity of actors in order to know their values are key in this process. In this sense, learning can be enabled while procuring the participation of a diversity of voices (Gerlak *et al.*, 2017).

Create venues for social interaction with plural participation in cross-scale linkages

"Venues for learning" are locations, places, decisions processes or forums where learning may take place (Gerlak *et al.*, 2017). Venues such as workshops, focus groups and meetings are considered key enabling factors for learning, followed by multi-stakeholder processes or collaborative forums, as well as multi-stakeholder organizational bodies such as networks. Spaces and processes that provide opportunities for face-to-face interaction and dialogue (Faysse *et al.*, 2014; Gerlak *et al.*, 2017), and include a diversity of stakeholders (Rodríguez Aboytes & Barth, 2020) are highlighted as key learning enablers. It has also been recognized as important to procure a diversity of learning settings including activities in nature and hands-on experiences (Rodríguez Aboytes & Barth, 2020). So called bridging or boundary organizations that link multiple actors through some form of strategic bridging are key in adaptive environmental governance, as they provide an arena for learning, trust building and conflict transformation between different forms of knowledge (Crona & Parker, 2012).

Foster time and space for collective reflection and dialogue

A key condition for transformative learning is the availability of time and space for reflection and dialogue (Rodríguez Aboytes & Barth, 2020). It is important that people can express their values, including emotions, narratives, stories and thoughts freely (Rodríguez Aboytes & Barth, 2020). This can be promoted through a diversity of types of gatherings from small, informal conversations to formal and structured meetings (Rodríguez Aboytes & Barth, 2020). Face-to-face social interaction is crucial as it enhances the understanding of the other and their values (Rodríguez Aboytes & Barth, 2020). Promoting an atmosphere of safety and trust supports the learning process, which could be in the form of network- and community-based organization groups (Rodríguez Aboytes & Barth, 2020). It is important to maintain an open dialogue where new actors can participate and openness to new ideas (Gerlak *et al.*, 2020); this implies also transparency and knowledge diversity (Wolfram *et al.*, 2019).

Establish methods, agreements, facilitation and routines for collaboration and integration of diverse values

Processes based on diverse social actors usually represent a great challenge. Since power relations and conflicts are inherent to these processes, it is important to promote the use of participatory methods for dialogue, negotiation and decision-making, as well as professional facilitation sensible to diverse values and transformative learning processes (Rodríguez Aboytes & Barth, 2020). It is also important to design venues for collaboration and formalize cross-sector and multi-stakeholder decision-making that includes bridging organizations (Gerlak *et al.*, 2020). Furthermore, it is recommended that agreements on methods, rules and routines are established collectively. Routines for sharing, translating and dissemination of information are crucial to build a collective memory of the process (Gerlak *et al.*, 2020).

Foster attitudes of openness for a transformative experience

Predisposition, openness and curiosity for learning with, from and for diversity is an important condition for learning processes that promote the inclusion of diverse values (Rodríguez Aboytes & Barth, 2020). This implies the willingness to include multiple perspectives and values in the decision-making and governance process, as well as a sensibilization of the diversity of values and actors implied by those processes.

5.5 CASE STUDIES OF VALUE-CENTRED PATHWAYS TO SUSTAINABLE FUTURES: GREEN ECONOMY, DEGROWTH, EARTH STEWARDSHIP AND NATURE PROTECTION

5.5.1 Introduction

There is no single pathway towards just and sustainable futures. Even where nations are able to overcome differences to sign up to a common set of goals (i.e., the SDGs), there are still multiple and contested pathways to achieving these which stem from different underlying worldviews and values, different views about leverage points for transformative change, and politics. Alternative pathways to sustainability often share key goals, such as reducing drivers of biodiversity loss, or advancing intergenerational equity, but they differ in the process expected to achieve goals, with implications for the impacts on different groups of humans and other-than-human nature. Understanding alternative pathways, and their constituent values and actors, is a way to avoid bias in an assessment because it aids transparency about which values are articulated in particular policies and practices.

A pathway to transformation is defined as a strategy for getting to a desired future based on a recognisable body of sustainability thinking and practice, driven by an identifiable coalition of researchers, practitioners and advocates.
In the context of the current assessment, pathways are differentiated by the kinds of solution framework they propose in response to the biodiversity and climate emergencies. These differences in proposed solutions can also be linked to differences in underlying knowledge and values, as well as different ways of understanding how transformative change happens. A comparative review of four co-existing pathways to sustainability is presented, each involving a co-production of knowledge and values and each in its own way advocating a potentially game-changing and transformative agenda: green economy, degrowth, earth stewardship and nature protection.

This selection of pathways is not intended to be comprehensive but to represent critical elements of diversity among relatively well established and identifiable coalitions. Pathways were selected through expert judgment based on prior typologies. In particular, the one based on the typology of values perspectives identified in the Nature Futures Framework (NFF) study (Pereira *et al.*, 2020). This includes a "nature for society" perspective based on instrumental values of nature as ecosystem services; a "nature as culture" perspective based more on relational values and the importance of living in harmony with nature; and a "nature for nature" perspective based on intrinsic values and making space for nature (Pereira *et al.*, 2020). The pathways adopted cover this diversity and are more readily identifiable as existing bodies of knowledge, values and practice. Green economy represents "nature for society", earth stewardship represents "nature as culture" and nature protection represents "nature for nature". In addition, the degrowth (incorporating postgrowth) pathway is included as a prominent example of a more cross-cutting perspective that straddles the Nature Futures Framework categories, advocating the meeting of well-being needs through redistribution rather than growth. The inclusion of degrowth is justified by meeting our definition of a pathway, for example the recognisable body of knowledge and associated actors is evidenced by the number of publications (Web of Science, Nov. 2nd 2021 shows 2,981 hits for the search string (degrow* OR "post growth")), and by its own identifiable conferences and journals.

- **Green economy** emphasizes solutions based on reform to economic performance metrics, institutions and technologies. This solutions framework is underpinned by a conception of nature as an asset to be managed for human wellbeing, highlighting nature's instrumental values.

- **Degrowth** is a pathway that emphasizes strategies that reduce the material throughput amongst wealthy societies, protecting human wellbeing through better distribution of material wealth rather than growth. This solutions framework stems from a central value to sustain life in all its forms and for humans to live by the value of sufficiency and within planetary boundaries.

- **Earth stewardship** is a pathway that emphasizes the strengthening of local sovereignty, including agrarian reform. This solutions framework is underpinned by prioritisation of solidarity, between humans as well as between humans and other-than-human nature, with a goal to promote biocultural flourishing.

- **Nature Protection** is a pathway that calls for a greatly expanded network of nature conservation areas (such as protected areas) to ensure a future for all life on earth. This position prioritises intrinsic over instrumental values, with protection of biodiversity for its own sake seen as an essential condition for restoring balance between humans and nature.

The examination of these pathways serves an extremely important function due to the inherent limitations of existing knowledge of transformative change. Much of what has been learned about transformative change draws on

historical cases of technology change, for example the transition from sailing ships to steam ships (Geels, 2002). Such cases are not strictly comparable with the current situation, because they do not constitute directed, governed responses towards a specified goal, and certainly not on environmental grounds (Newell, 2015). Also, hindsight allows a much cleaner and sanitised view of the process of change, which is advantageous for theory development but may miss much contemporary detail. By contrast, ongoing movements for transformations to sustainability, emerging amidst constructive ideological conflict between pathways like green economy, degrowth, earth stewardship and nature protection, provide the "messy" contemporaneous view of contested attempts to direct and govern transformative change.

The review of each pathway summarises its key characteristics, including the broad values characterising human-nature relations, the way values are conceived as leverage points for transformative change, and key policies that flow from these underpinning beliefs **(Table 5.9)**. The comparison of pathways highlights that environmentalists' calls to mobilize more diverse values of nature are themselves diverse and contested. However, the comparison does identify shared agendas, including confirmation that all pathways seek to incorporate more diverse values of nature (albeit different forms of pluralism). All pathways also seek to respect ecological boundaries to pursue a common future that is cognisant of peoples' dependencies on nature. It would be naive to suggest that such common ground is a basis for a single, agreed pathway. Indeed, intense debate across different pathways of environmentalism is an important form of knowledge co-production. However, the presence of meaningful, shared goals is a key condition for such co-production, along with recognition of the knowledge pluralism that underpins different positions and opportunity for quality dialogue between these (Norström *et al.*, 2020).

Table 5 9 **Overview of green economy, degrowth, earth stewardship and nature protection pathways.**

	Green economy	Degrowth	Earth stewardship	Nature protection	All Pathways
Key bodies of knowledge	• Economics • Ecosystem services	• Ecological economics • Political ecology • Post-development	• Sustainability science • Traditional ecological knowledge • Environmental ethics	• Conservation science • Evolutionary ecology • Environmental ethics	• Climate and ecological crisis
Fundamental driver of biodiversity loss	• Institutional failure (especially market failure)	• Material expansion driven by economic growth	• Structural power imbalance blocking diverse values	• Failure to respect and care for other-than-human life	• Failure to respect biophysical boundaries
Key requirement for transformative change	• Enable accounting of values of nature • Incentives for pro-environmental behaviour	• Reducing material throughput of societies • Wealth redistribution	• Local sovereignty linked to territory and agrarian reform • Biocultural conservation	• Recognise intrinsic value of nature • Biodiversity conservation	• Respect biophysical boundaries
Sustainability-aligned values	• Nature as asset • Democracy • Utilitarianism (pareto optimality)	• Diversity • Egalitarianism • Sufficiency • Conviviality	• Responsibility • Care/solidarity across species • Pluralism	• Ecocentrism • Care/solidarity across species • Responsibility	• Intergenerational justice
Core values agenda	• Ensure nature's values inform institutions and incentives	• Rebalance economic with social and ecological values (escape economism)	• Challenge discrimination to mobilise more diverse values	• Recognise and prioritise the intrinsic value of the diversity of life at all scales	• Diversity and balance values of nature incorporated in decision-making
Emblematic policies	• Alternative metric to Gross domestic product • Shift taxation from labour to use of nature	• Work time reduction • Basic income • Green and progressive taxation	• Shift from preservationist to biocultural approach to conservation • Land reforms and IPLC rights	• Major expansion of area-based conservation • 'Half Earth' to be gazetted as protected areas	

5.5.2 Green economy pathway

In almost all parts of the world, market forces play a critically important role in shaping behaviour and decisions. Failure of these market forces to capture nature's diverse values, and the costs associated with their loss, have been identified as a major driver behind the loss of biodiversity and ecosystem services/ nature´s contributions to people (TEEB, 2010). Many costs caused by environmental decline are not included in economic decision-making (giving rise to *external effects*, i.e., benefits or costs imposed on others) and not captured in national accounts or company balance sheets unless states mandate their internalisation or unless damages are claimed in courts. These issues point to the need for a substantial reform of economies. Against this background, a green economy can be defined *'as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcity'* (UNEP, 2011, p. 16).

Role of values and valuation of nature

Many natural goods and services have characteristics similar to a public good: they provide benefits for many people. According to a classical result from economic theory, the marginal costs of providing or protecting such a public good should be equal to the sum of marginal benefits for all individuals in society in order to achieve Pareto efficiency, i.e., an outcome such that there is no feasible alternative that all would prefer (Samuelson, 1954). In other words, Pareto efficiency requires that all values (defined in this pathway as the totality of anthropocentric values) affected by a change in the provision of natural goods and services need to be taken into account.

One way of accounting for all values in this manner is to issue Pigouvian environmental taxes or subsidies equal to the sum of all values – measured as marginal benefits and costs – of all affected by an activity (Pigou, 1920). One example is to tax carbon emissions at a rate equal to the present value of all climate damages caused by an extra tonne of CO_2, i.e., the social cost of carbon. Another example is to tax the use of pesticides that impose risks to human health and ecosystems (Finger *et al.*, 2017). With a pesticide tax in place, farmers would have an incentive to take the multiple risks of pesticides into account and to substitute for less risky plant protection measures (Finger *et al.*, 2017). Empirical evidence for European countries suggests that such taxes need to be sufficiently high to have a substantial effect on pesticide use (Böcker & Finger, 2016, 2017).

This kind of market intervention also generates social costs, i.e., costs for the government and for market participants, and thus is not always the best solution (Coase, 1960). Alternative to this established green economy approach, there are options to keep essential parts of nature outside the market system. Examples include protected areas or standards of good farming practice that include maximum livestock levels per hectare, compulsory set-aside of farm area for nature or the ban of particularly harmful pesticides or their use in specified contexts, although such measures are often implemented insufficiently (Pe'er *et al.*, 2019).

An equal representation of the diverse values of nature within economic valuations relies on social equity, as expressed in the UNEP (2011) definition of a green economy. This is because individual economic values depend on the individual's income and wealth. As a consequence, aggregate economic values of nature depend on the distribution of income and wealth in society (Baumgärtner *et al.*, 2017; Drupp *et al.*, 2018; Ebert, 2003; Meya, 2020). Baumgärtner *et al.* (2017) show that the global economic value of biodiversity would be 16% higher if income was perfectly evenly distributed. An important element in the green economy concerns its ability to meet the basic needs for all, without undermining the ecological life-support systems on which the economy relies, as stated in the Sustainable Development Goals (SDGs). Currently, however, some rich countries satisfy basic needs, but overshoot ecological boundaries, whereas some poor countries operate within ecological limits, but fail to cover people's basic needs (Dasgupta, 2021; O'Neill *et al.*, 2017). International cooperation is needed to achieve green economies that meet both basic needs and ecological sustainability (Pearce *et al.*, 1989).

Exploiting natural resources generates current economic benefits, but often diminishes future values. In a green economy, these effects on future values need to be taken into account and balanced against current benefits. In economic decision-making, this requires expressing values that accrue in the future in equivalents of present values (or express present values in equivalents of future values). This procedure is termed "discounting". The discount rate for private consumption goods is typically positive, i.e., the present value of consumption benefit decreases the further in the future these benefits accrue. The higher the discount rate, the higher future benefits have to be to warrant current investment. For natural goods and services, the appropriate discount rate is substantially lower than the discount rate for private consumption goods, and may well be negative, i.e., the present value of nature's benefits in the future exceeds the current value (Drupp *et al.*, 2018; Gollier, 2012; Hoel & Sterner, 2007; Weikard & Zhu, 2005). Following this line of argument, the Ministry of Finance in the Netherlands recommends discounting natural goods and services at a one percentage point lower rate than private consumption goods (Koetse *et al.*, 2018). Investments that improve natural goods and services in the future thus are relatively preferred to those that would provide private consumption benefits.

Measuring economic development in a green economy requires a reform of national accounting schemes, because current accounts, in particular measures of gross domestic product, do not adequately include values of nature and their effects on human welfare (Dasgupta, 2021; Stiglitz *et al.*, 2009). As a response, most states committed themselves under the Convention on Biological Diversity (Aichi Biodiversity Target 2) to integrate natural capital into national accounts by 2020, and new international guidelines to do this are on the way (United Nations, 2021; United Nations *et al.*, 2014). However, this has not yet been accomplished in most countries, so that those goods and services from natural capital, that are public and not traded on markets, are still not captured in accounts (see 4.2). For instance, revenues from timber harvesting are included in national accounts, but the opportunity costs of deforestation are not. A prominent example for a juridically enforced damage compensation is the 2010 BP Deepwater Horizon oil spill in the Gulf of Mexico, where the polluter was sentenced to pay $8.8 billion for the damages to the natural environment, which is in line with values stated by affected households (Bishop *et al.*, 2017). In practice, unaccounted costs are often shifted towards future generations (Kapp, 1977; TEEB, 2010), which is becoming a fundamental barrier for achieving sustainable and just futures. To overcome these issues, inclusive wealth accounting has been proposed (Arrow *et al.*, 2003; Dasgupta, 2021; Martinet, 2011). Inclusive wealth measures the social worth of all natural and human-made assets in terms of their contributions to human welfare (Dasgupta, 2021), and thus in particular includes the diverse values that natural assets have for humans.

Main instruments to account for nature's diverse values

To achieve the transition towards a just and sustainable future, material resource use has to be reduced, whenever it goes beyond ecological and environmental carrying capacity, whereas non-material goods and services (e.g., literature, entertainment, software) can continue to grow and increase prosperity (Jackson, 2017).

Economic tools that hold potential for transformation towards a green economy include national accounting systems to account and correct for social and environmental costs; ecological tax and subsidy reforms; directing technical change towards environmentally friendly technologies (Acemoglu *et al.*, 2012), and economic instruments like tradable permits for resource use and pollution, liability law or compensation schemes such as payments for ecosystem services (PES, Engel *et al.*, 2008). These schemes typically consist of compensation from ecosystem service users to ecosystem service providers for the provision of a bundle of ecosystem services, upon the fulfilment of a set of agreed conditions.

A green economy pathway aims to prevent social and environmental cost-shifting and it recognizes and appropriately compensates the stewardship of nature's values (Pearce, 1992). Progress in this direction so far has generally relied on two main principles: the "polluter pays principle" and the "provider gets principle". The "polluter pays principle" aims at preventing negative externalities and cost shifting. It is claimed to be grounded on an ethic of responsibility, according to which the economic agents causing environmental harm pay for the costs of the negative externalities they create. Examples include the taxation of pollution, land use and resource depletion as well as the pricing of pollutants in cap-and-trade systems. The "provider gets principle" aims at incentivising positive externalities through the production, stewardship and protection of values of nature that are ignored by markets and under-recognized in the economy. These may include tax exemptions, green subsidies and payments for ecosystem services mechanisms. One example is ecological fiscal transfers, where regions conserving biodiversity are compensated by financial payments from regions that supply less biodiversity or higher levels of government. For example, in Portugal these transfers have resulted in the extension of protected areas (Droste *et al.*, 2017, 2019, 2018a, 2018b).

Economic instruments can give visibility to under-recognized values and costs, and the incentives they set can act as a powerful driver of pro-environmental behavioural. An example is the tax/price on plastic bags in Ireland and other places, where the enforcement of the economic instrument was accompanied by a sensitization campaign on the environmental harm of plastic that resulted in a massive drop in the use of plastic bags. However, these instruments are not a panacea (Ostrom *et al.*, 2007), and there are also cases where inappropriately designed conservation payments schemes have led to the erosion of intrinsic values and motivations (Rode *et al.*, 2015).

The transition to a green economy remains an enormous challenge. Whereas the above examples show that changes towards a greener economy can be successful, these are mostly piecemeal improvements. By and large, governments, and also intergovernmental organizations like the Organization for Economic Co-operation and Development or the World Bank, have paid considerable attention to economic growth, which has historically been the most important mechanism to lift people out of poverty. Past economic growth, however, has been accompanied by expanding use of natural resources, emissions of greenhouse gases, and depletion of ecosystems (Peters *et al.*, 2011; Wiedmann *et al.*, 2013), although here and there some progress is made (Acosta *et al.*, 2019). The transformation towards green economies requires implementing the envisaged change in accounting systems to fully take into account sustainability concerns and nature's contributions to human well-being (Dasgupta,

2021), ecological tax reforms that promote social equity, and the use of economic instruments that set incentives to preserve and enhance the diverse values of nature affected by economic decision-making.

5.5.3 Degrowth pathway

Degrowth is a political, economic, and social movement based on ecological economics and influenced by anti-consumerist and anti-capitalist ideas. It does not claim one unitary theory or plan of action. Rather, it covers a wide ensemble of discourses and practices aiming to steer transformative change while adopting the sustainability of life as its core value. Degrowth calls for an organized slowing down of society, to minimise harm to humans and other-than-human nature, with a focus on reducing material throughput in affluent societies (Kallis *et al.*, 2020).

Degrowth and post-growth theorists conceive economic growth and associated material expansion as the main driver of biodiversity loss, resource depletion, and environmental degradation (Otero *et al.*, 2020). A central tenet of degrowth is hence that economic growth cannot continue forever in a finite planet (Gorz, 1980; Latouche, 2009). The key postulate is that beyond a certain scale, the economy enter into conflict with ecological life-support systems (Daly, 1996), the costs of growth accelerate (Kapp, 1978), and environmental conflicts multiply (Martinez-Alier *et al.*, 2010). Consequently, degrowth should pursue a downscaling of production and consumption that reduces the throughput of energy and resources in industrialized countries, as a means to achieve global environmental sustainability, social justice and equitable well-being (Kallis, 2017).

In the tradition of "limits to growth" thinking, the degrowth pathway rests on a thermodynamic vision of the economy, first elaborated by Georgescu-Roegen (1971) and later popularized by the field of ecological economics (Daly, 1996; Gómez-Baggethun, 2020; Martínez-Alier & Schlüpmann, 1987). This vision portrays the economy as a subsystem of the biosphere, where the economy depends on ecosystems as both source of resources and as sink for waste (Daly, 1996; Dasgupta, 2021). Industrial metabolism transforms energy and materials into goods and services, in a process that irreversibly converts (low entropy) stocks of resources into (high entropy) waste. The earth is a closed system for materials (except for the negligible event of meteorites) and solar energy enters at a fixed rate, so physical stocks of resources are finite (Georgescu-Roegen, 1971). Recycling is a partial solution but has a high energy cost (Dasgupta & Heal, 1980). Renewable technologies are part of the solution too, but deploying them at the scale required to replace fossil fuels, and expanding them in pace with continued economic growth, would require massive amounts of finite materials, including rare minerals (Vidal *et al.*, 2013). Hence, according to this theory, the economy cannot grow perpetually: the scale of the economic sub-system is limited by the size of the host ecosystem (Daly, 1996; Dasgupta, 2021; Latouche, 2009).

Role of values and valuation of nature

Degrowth envisions transformative change by means of downscaling production and consumption in industrial societies, while mobilizing values and building institutions and relationships that allow human societies to flourish without growth. Core values considered to be aligned with a degrowth transformation towards a just and sustainable future include preferences for diversity over standardisation, durability over efficiency, cooperation over competition, community over individualism, sufficiency over luxury and commoning over commodification of resources. Degrowth rejects some core capitalist values including the value hierarchies established between e.g., productive (paid) and reproductive (unpaid) labour, private and common property, work and leisure, and human and other-than-human life (D'Alisa *et al.*, 2014).

Degrowth conceives the broad values of sustainability and justice as inseparable, requiring integrated strategies. From the degrowth vision, continued economic increase is incompatible with environmental sustainability, so redistribution is favoured over expansion to secure social justice (a good life for all) within environmental limits. This conception of justice prioritises egalitarian over utilitarian principles. As opposed to meritocracy, degrowth conceives egalitarianism not only as a point of departure (i.e., equal opportunities) but as an end in itself, premised on the idea that no one should be deprived from basic human needs while no one should be entitled to appropriate status-seeking amounts of resources and ecological space. Social justice is thereby defined by both minimum and maximum thresholds of consumption and capabilities.

The environmental values of degrowth are rooted in ideas of "strong sustainability", where biodiversity, nature´s contributions to people, and core ecological processes are seen as irreplaceable by technology and built infrastructure. This implies that models of societal progress in which economic growth compromises biodiversity and ecological life support systems are unfit for sustainability. Other core values of degrowth include autonomy, sufficiency, caring, and commoning. Autonomy in the degrowth vision includes multiple dimensions: freedom from large technology infrastructures and the centralised institutions required to manage them; freedom from wage-labour (the sphere of non-paid work where people enjoy leisure and produce for their own use); the ability of a collective to decide its future in common; and freedom from external imperatives, such as the laws of a religion not of one's own choosing, or the laws of the economy (growth) (D'Alisa *et al.*, 2014).

In line with ecological economics ideas (Gómez-Baggethun & Martín-López, 2015; Martínez-Alier & Schlüpmann, 1987), degrowth acknowledges incommensurability of values and the idea that diverse values and valuation languages are needed to capture the multiple ways in which people attribute meaning and importance to biodiversity, nature, and nature´s contributions to people. Degrowth therefore opposes the extension of market values, logic, and language into novel social and ecological domains. Indeed, it argues for de-commodification of both human-human and human-nature relationships (Gómez-Baggethun, 2015). In line with this view, it rejects the "new conservation" model (e.g., Kareiva & Marvier, 2012) that sees the generalized use of monetary valuation and market-based instruments as the solution for environmental protection. Within the prevailing institutional setting in market societies, degrowth theorists argue that a focus on monetary values paves the way for the commodification of human-nature relations, and point to research findings that this can "crowd out" intrinsic motivations for conservation (sustainability-aligned values based on care and stewardship) by inducing a logic of short-term economic calculus (Rode *et al.*, 2015). Degrowth advocates have however defended selective uses of monetary valuations of nature, under conditions where these can promote environmental improvement, distributive justice, value pluralism, and avoid commodification (Kallis *et al.*, 2013).

Main policy proposals for a degrowth pathway

Major policy proposals in the degrowth and post-growth literatures include (i) the adoption of alternative indicators of economic progress, (ii) green and just tax reforms, (iii) subsidy reforms, (iv) work sharing, (v) re-regulating trade, (vi) establish maximum-minimum income ratios, and (vii) secure universal basic needs (D'Alisa *et al.*, 2014; Daly, 2013; Kallis, 2017; Latouche, 2009; Otero *et al.*, 2020; Sandbrook *et al.*, 2020).

First, degrowth makes a case for measuring values differently and adopting alternative indicators of economic progress. Gross domestic product growth has long been criticised as a poor indicator of progress, because it fails to value social and environmental costs, economic inequalities, and domestic work, resulting in overall poor measures of human well-being. The Human Development Index is a step forward in measuring quality of life but ignores environmental sustainability (Hickel, 2020). In a green economy, progress indicators would focus on the well-being of present and future generations. Indicators such as the Genuine Progress Indicator (GPI), the Indicator of Sustainable Economic Welfare (ISEW), the Sustainable Development Index (SDI), and Inclusive Wealth make progress in this direction but remain poorly incorporated in national accounts.

Second, degrowth defends green and just tax reforms. Economic activities and means of transport involving large environmental costs should be taxed. In common with the green economy pathway, this involves shifting the tax base from labour to the entropic throughput of resources extracted from nature (depletion) and returned to nature (pollution) (Daly, 2013). Degrowth also makes a case for taxing and regulating advertisement, conceived as a machinery to artificially build human wants and promote unnecessary consumption. Degrowth also involves reducing waste and confronting planned obsolescence (Georgescu-Roegen, 1975), meaning that repairing products should be a more affordable option than buying new ones. Tax releases on repairs can help moving in this direction. Experiences like the yellow vests movement that shook France in 2018 have shown that environmental taxes and policies that are perceived to benefit the elites are likely to encounter wide societal opposition. A future that is both sustainable and just hence requires that green taxation pays attention to inequalities and is combined with redistributive taxation (Klenert *et al.*, 2018). This can be achieved by combining green taxes with progressive taxes on income, wealth and capital.

Third, revenue from green taxes should be earmarked for further investment in sustainability, including green subsidy reforms. The key principle of a green subsidy reform is shifting subsidies away from activities that degrade the environment and towards activities that protect it. This may include reallocating subsidies and incentives from fossil fuels towards renewable energies, and from soil and biodiversity degrading agroindustry towards agri-environmental schemes that promote sustainable farming (Pe'er *et al.*, 2019).

Fourth, in a degrowth society the volume and distribution of work must be compatible with sustainable futures. Working time drives consumption, which is the strongest determinant of global environmental impacts (Wiedmann *et al.*, 2020). In the degrowth perspective, work time reduction is seen as a key policy measure for reducing environmental pressure, buffering the unemployment effects of automatization, and increasing life satisfaction. This can be achieved by using productivity gains from technological development for expanding leisure time instead of expanding economic output (Kallis *et al.*, 2013).

Fifth, a degrowth pathway involves re-regulating international commerce, moving away from free trade, free capital mobility, and globalisation. Ecological tax reform, and other environmental regulations to reduce or prevent environmental costs will raise prices and put environmentally sustainable economies at a competitive disadvantage in international trade. Compensating environmental tariffs can be a powerful measure to protect policies of environmental cost reduction from standards-lowering competition with corporations that are not required to pay the social and environmental costs they inflict (Daly, 2013).

Sixth, post-growth measures to reduce inequalities in income distribution include the establishment of a minimum income and a maximum income. Unlimited inequality is unfair and unsustainable, undermining the sense of community, democracy or common purpose. Wage ratios between highest earners and median earners in corporations are frequently well over 1000 to 1. But some industrial nations have wage ratios below 25 and limiting maximum-minimum income ratios (say to 100, 50, 20 or 10) would drastically reduce inequality. People who have reached the limit could either work for nothing at the margin if they enjoy their work, or devote their extra time to hobbies or public service. The demand left unmet by those at the top could be filled by those who are below the maximum (Alexander, 2014; Daly, 2013).

Degrowth is not sympathetic to top down population control, but declares sympathy to feminist movements that defends women's right to decide on procreation (D'Alisa *et al.*, 2014). Since degrowth emphasizes material contraction in the affluent parts of the world, where population is stabilising and even expected to decrease, population is not seen as a major barrier for degrowth.

5.5.4 Earth stewardship and biocultural conservation

Earth stewardship refers to responsible use and protection of the land through sustainable practices (Chapin III *et al.*, 2009), as well as values and concepts that guide local initiatives of biocultural conservation (Rozzi *et al.*, 2015). Local environmental stewardship has been studied in different types of habitats, including forests (Adhikari *et al.*, 2007; English *et al.*, 1997; Kilgore *et al.*, 2008; Messier *et al.*, 2015; Rozzi *et al.*, 2012), freshwater (Kreutzwiser *et al.*, 2011; Shandas & Messer, 2008), grasslands and rangelands (Appiah-Opoku, 2007; Henderson *et al.*, 2014; Sayre *et al.*, 2013; Squires, 2012), rural agricultural landscapes (Ellis, 2013; Gill, 2014; Plummer *et al.*, 2008; Raymond *et al.*, 2016; Worrell & Appleby, 2000), urban environments (Connolly *et al.*, 2014; Elands *et al.*, 2019; Krasny & Tidball, 2012; Romolini *et al.*, 2016), fisheries (Gray & Hatchard, 2007; Medeiros *et al.*, 2014; van Putten *et al.*, 2014) and coastal or marine habitats (Ban *et al.*, 2019; Sharpe & Conrad, 2006; Silbernagel *et al.*, 2015). Earth stewardship is, however, a biocultural practice because it operates at the interface of biophysical and cultural domains (Rozzi, 2020). Human languages, cultures and local environments have been moulded co-constitutively throughout the evolutionary histories of our species, *Homo sapiens*. Recent studies have demonstrated positive correlations between biological diversity and linguistic diversity derived from coevolution processes of human groups with their local ecosystems (Loh & Harmon, 2005; Maffi, 2001).

Earth stewardship is a pathway for transformative change that involves the responsible use and protection of biodiversity. With its links to biocultural conservation, Earth stewardship is distinguished by its emphasis on multiple social and environmental values associated with a plethora of ancient and current worldviews and cultures, their attachments to local territories and their religious and philosophical traditions (Callicott, 1994). Hence, the combination of Earth stewardship and biocultural diversity constitute a form of pathway that is attentive to and incorporates worldviews and practices that are already present, in diverse forms, in local practices around the world. Exercising Earth stewardship involves enabling the expression of these existing ways of knowing and living with nature, by removing obstacles.

Role of values and valuation of nature

Key values prioritised by Earth stewardship include responsibility, care, otherness, *balanced/rational* use, reciprocity, belonging, collaboration, innovation and a sense of socio-environmental justice. These values of nature are expressed by different actors involved in practices such as participatory conservation, alternative education, agroecology, and custodianship of biocultural rights. Loss of biocultural diversity and land stewardship practices have a long history, which today are driven by global processes of enclosure and accumulation of land property (land-grabbing) that displace indigenous and peasant communities from their territories. This is accompanied by rapidly expanding agriculture and timber monocultures. The contemporary concentration of food production in a few corporations with global distribution is identified as a driver that supplants the (sustainability-aligned) values and life-habits of local communities, exacerbating their dependence and undermining the material and cultural basis for living well. These processes are driving biocultural homogenization.

Emblematic policies for earth stewardship are rooted in dialogue and local knowledge. Responsible land use requires multi-sectoral negotiation and genuine dialogues that take place with awareness of conditions of inequality and asymmetry of power. There are cases of local resistance to dialogue due to fear of cultural assimilation, or due to limitations to genuine representation of different cultural values and habits. For this reason, the need for recognition, trust, and respect in conditions of power asymmetry need to be highlighted in processes of earth stewardship and biocultural conservation.

Earth stewardship requires a shift from a preservationist (nature protection) model of conservation to one based on biocultural approaches. This approach markedly contrasts with the Half-Earth initiative that calls for keeping half of the world's land and sea as wild and protected from human

intervention or activity as possible (Wilson, 2016). This model of conservation prioritises protection of biodiversity but does not acknowledge the positive correlations found between biological and cultural diversity (Gorenflo *et al.*, 2012; Maffi, 2018). Whether or not conservation has an ethical obligation to benefit rural communities is a question of values to be negotiated and debated from the community level to the forums of transnational conservation (Igoe & Brockington, 2007). But such negotiations and debates are better informed by taking into account the role that diverse communities have played for centuries in the maintenance of biodiversity in different ecosystems, and by the current role played by custodians of biocultural rights (Bavikatte & Bennett, 2015; Rozzi *et al.*, 2018).

Main practical applications of an earth stewardship pathway

The systematic review of earth stewardship and biocultural diversity literature revealed 9 clusters of applied case studies **(Table 5.10)**. The first two of these clusters are summarised below to illustrate the kinds of ways in which earth stewardship ideas are translated into practice (the remaining seven clusters are included in supplementary materials)[14].

14. Earth stewardship and biocultural conservation projects. https://doi.org/10.5281/zenodo.4379171

Earth stewardship applied to protected areas

Engagement and participation of people is central to an approach to protected areas that puts earth stewardship into action (Enkerlin-Hoeflich *et al.*, 2015). Worldwide, there are 245,848 protected areas covering 245 countries and territories (UNEP-WCMC, 2019). However, conservation efforts do not end in the creation of protected areas, and conflicts arise between ecology, economics, culture, and politics (Borgerhoff-Mulder & Coppolillo, 2005). It is essential to broaden debates on the purposes of protected areas in terms of critically contributing to human well-being and socio-environmental justice (Enkerlin-Hoeflich *et al.*, 2015).

As shown in Chapter 4, involving local communities as co-managers or stewards often leads to more socially positive outcomes treating them as mere beneficiaries or excluding all forms of uses as proposed in strict preservationist criteria. For example, preservationist policies that lacked consideration for the values and life-habits of IPLC in national parks in Africa have had negative social and environmental outcomes (Woodhouse & McCabe, 2018). In contrast, in protected areas where multiple uses are allowed there is a greater representation of diverse values of nature held by multiple stakeholders fostering stronger conservation and social outcomes (FAO & UNEP, 2020). Today, however, there are growing conflicts derived from policies that include deregulation of protected areas and displacement of local communities which have had

Table 5 10 **Applications of earth stewardship and biocultural diversity approaches, with associated Web of science research areas.**

Cluster No	Cluster name	Web of science research areas
1	**Protected areas**	Biodiversity conservation, public administration, water resources, archaeology
2	**Education**	Education educational research, information science library science, psychology, communication
3	**Agri-productive stewardship**	Forestry, agriculture, fisheries, food science technology, entomology, veterinary science
4	**Health**	Infectious disease, pharmacology pharmacy, public environmental occupational health, health care sciences services, life sciences biomedicine other topics, nursing, medical laboratory technology, oncology, biomedical social sciences
5	**Legal framework areas**	Government law, developments stud, social issues, international relation
6	**Traditional Ecological Knowledge**	Geography, social science and other issues, anthropology, linguistic, cultural studies
7	**Religion**	Religion
8	**Ethics and values**	History philosophy of science, arts humanities other topics, history, philosophy, arts, literature
9	**Long Term Socio-Ecological Research (LTSER)**	Environmental science ecology, science technology other topic, urban studies, marine freshwater biology, oceanography, remote sensing

consequences on exclusion of populations and have been based mostly on narrow economic values (Agrawal & Redford, 2009; Igoe & Brockington, 2007; West, 2005).

Among models of protected areas that contribute to biocultural conservation and earth stewardship, UNESCO biosphere reserves, other effective area-based conservation measures' (OECMs) now recognized by Jonas *et al.* (2017), and indigenous and community conserved areas stand out (Bray *et al.*, 2012; Enkerlin-Hoeflich *et al.*, 2015; Mackey & Claudie, 2015; Muller, 2003; Rozzi *et al.*, 2015). These are managed with or by indigenous peoples, and foster socio-environmental justice (e.g., United Nations Declaration of the Rights of Indigenous Peoples, United Nations, 2007). Currently, 144 countries have recognized indigenous peoples' rights to self-determination, cultural identity, and free prior informed consent to uses that affect their traditional territory (United Nations, 2007). The biosphere model was created in the 1970s and is coordinated by the UNESCO Man and Biopsphere (MaB) Program (Reed & Price, 2019). Today, the world's 701 biosphere reserves form an international, intergovernmental network that has the potential of conserving landscapes and expanding positive people and nature relationships through biocultural conservation at regional scales (Karez *et al.*, 2016). Biosphere reserves combine biodiversity conservation, socioeconomic development and education, training, research, and monitoring. What is needed is to strengthen interactions among different stakeholders (Ishwaran *et al.*, 2008) to strengthen biocultural conservation (Karez *et al.*, 2016).

In 2003, the indigenous and community conserved areas were recommended at the 5th IUCN World Parks Congress in Durban, South Africa (Corrigan & Granziera, 2010). Indigenous peoples and local communities engage with the environment driven by a combination of utilitarian, spiritual, cultural and aesthetic values (Borrini-Feyerabend *et al.*, 2014), which stimulate voluntary conservation areas subject to local laws and agreements (Berkes, 2009; Kothari, 2006). These conservation areas protect a wide range of species inhabiting agricultural and pastoral landscapes, managed through a wide diversity of institutions and rules by traditional and modern communities alike. These sites range from less than one hectare to entire mountains, lakes or land- and seascapes. While exhaustive information is not yet available, current estimates indicate that some 11% of the world's forests are under community ownership or administration, and that recognizing indigenous and community conserved areas may result in a doubling of the global territory under protected areas (Molnar *et al.*, 2004).

Earth stewardship applied to education

A diversity of educational programs are based on the values defined under the framework of earth stewardship. For example, promoting care, respect, reciprocity, and responsibility towards Earth and the beings with whom humans co-inhabit. Different education approaches promote values and reflection based on a diversity of religious and philosophical traditions, including IPLC philosophies such as good living *(Buen vivir)* in South America, *"ubuntu"* in South Africa, *"satoyama"* in Japan (Albó, 2018; Callicott, 1994; Mamani-Bernabé, 2015; Toyoda, 2018). IPLC philosophies acknowledge diversity and demand genuine intercultural dialogues, for example the core principles of *Buen vivir* education are: (a) intercultural cooperation, (b) reciprocity, and (c) collective action and solidarity (Coral-Guerrero, 2018; Fleuri & Fleuri, 2018; Macintyre *et al.*, 2017; Mboyo, 2019; Weber & Tascón, 2020). Education reaches far beyond the school and is embedded in everyday community life, including close relationships with nature (Bulloch, 2014; Coral-Guerrero, 2018; Fleuri & Fleuri, 2018; Kárpava & Moya, 2016; Macintyre *et al.*, 2017; Mendoza Zapata *et al.*, 2020) guided by indigenous and peasant worldviews and practices (Macintyre *et al.*, 2017; Mboyo, 2019; Meza-Mejía & Anchondo-Pavón, 2019; Noguera & Barreto, 2018; Rajah, 2019; Ritchie *et al.*, 2015; Ullrich, 2019; Valentín *et al.*, 2020; van der Walt, 2010).

IPLC philosophies and *Buen vivir* education foster earth stewardship by (i) balancing personal autonomy with community participation (Fleuri & Fleuri, 2018), (ii) acknowledging the key roles played by women and the pressures they experience (Herrera Acuña, 2016; White, 2010), (iii) teaching values for the preservation of culture and life (Macintyre *et al.*, 2017; Ullrich, 2019; Waghid, 2016; Weber & Tascón, 2020; Wu *et al.*, 2018), (iv) celebrating spirituality that connects humans and nature and heals historical trauma (Ullrich, 2019; Valentín *et al.*, 2020), and (v) connecting different generations (Noguera & Barreto, 2018; Ullrich, 2019). To implement these concepts and practices, formal modern schools will have to undertake intercultural dialogues enabling the participation of indigenous teachers as well as community members in decision-making (Artaraz & Calestani, 2015; Fleuri & Fleuri, 2018). These transformations are necessary to reconnect with nature not as something external to society and to advance socio-environmental justice by integrating biocultural diversity into formal and non-formal education (Fleuri & Fleuri, 2018; Macintyre *et al.*, 2017). Community pedagogy must necessarily be linked to Mother Earth and the cycles of life (Valentín *et al.*, 2020). Education is a tool to include those philosophies of good living in different development models (Kayira, 2015; Macintyre *et al.*, 2017; Woodhouse & McCabe, 2018). However, making effective the incorporation of the economies of good living implies reviewing the concept of sustainability in indigenous knowledge and going beyond the dominant epistemologies (Kayira, 2015).

Gender perspectives highlight indigenous and aboriginal women's movements for ensuring their rights, recognizing the current sufferings that stem from colonialism (Herrera

Acuña, 2016; White, 2010). Storytelling is a core vehicle that transmits values between generations and connects feminine power with the earth embodied in Mother Earth (Wabie, 2019; White, 2010). The biocentric conception is assumed as an inclusive and comprehensive public policy that promotes socio-community values throughout the pedagogical process (Tockman & Cameron, 2014; Valdez-López *et al.*, 2019). In Bolivia, the Plurinational State recognizes the fundamental principles of good living in its National Education Policy. In Brazil, indigenous people seek intercultural dialogues to participate in political, judicial, legislative, cultural and social institutions of the state, while challenging monocultural policies and school models and maintaining their identities as indigenous people (Fleuri & Fleuri, 2018; Rozzi *et al.*, 2018).

From a *local development* point of view, social and economic solidarity are essential (Coral-Guerrero, 2018; Kárpava & Moya, 2016). The *"Sumak Kawsay"* economy promotes a diverse, healthy, sufficient production, to share and trade for self-consumption. Other community development models are based on redistribution, emphasize leadership development, and affirm post-development premises (Alvarez, 2016; Artaraz & Calestani, 2015; Carretero & Baeza, 2017; Jiusto & Hersh, 2009).

Other examples of education programs that support earth stewardship include in Mexico intercultural universities that for over 20 years have included local communities in higher education (Dietz, 2012; Schmelkes, 2009); in the United States multicultural initiatives integrate minority groups and indigenous peoples in environmental studies (e.g., "intellectual diversity" program in the teaching of environmental sciences at SUNY College of Environmental Science and Forestry in Syracuse (Kimmerer, 1998, 2012)), or the Department of Fisheries and Wildlife at Oregon State University that interweaves local knowledge in natural resources curricula (Li, 1996); in Chile, the Program on "Conservation and Management of Sub-Antarctic Natural Resources" at the University of Magallanes, Chile, which emphasizes the interrelation between biological and cultural diversity (Rozzi *et al.*, 2010); in Australia, the Environmental Education Centres (EECs) networks funded by the Queensland Department of Education and Training across the country that has generated place-based education experiences involving inter-institutional programs (e.g., schools and universities) and non-formal education (e.g., recreation and ecotourism) (Casey *et al.*, 2019).

Case studies from area-based conservation and education provide three general lessons. Firstly, it is necessary to overcome a preservationist approach to conservation in order to link biocultural conservation to the well-being of local communities. This requires new conditions for conservation or restoration that support the connections of indigenous and local communities with their territories. This demands the participation of people in the management and care of biodiversity, an approach compatible with the MaB-UNESCO model of biosphere reserves; and other co-management models such as the *indigenous and community conserved areas* that conserve over 10% of the world's forest area (Molnar *et al.*, 2004; RRI, 2015). Secondly, the protection of land by IPLC favours environmental, social, and economic sustainability. Local territories are the root of diverse values of nature, cultural identity, and consequently enhance earth stewardship and conservation of biocultural diversity. Notably, in Africa, Asia and Latin America, the areas with lower deforestation rates are those in which indigenous peoples have secured rights over forest resources through community-based tenure (FAO & UNEP, 2020). Thirdly, education has a fundamental role in conserving or recovering the links between societies and nature. In the 21st century, different educational programs that favour the inclusion of the diversity of knowledge have been developed worldwide. These new educational approaches criticise those educational policies that emphasize universal knowledge over unique local human skills, and recognise different philosophies like *Buen vivir*, as well as biological and cultural diversity.

5.5.5 Nature protection pathway

The hallmark of the nature protection pathway is the belief that successful conservation cannot be underpinned by either instrumental values or relational values alone, and will require much stronger emphasis on intrinsic values (Pereira *et al.*, 2020). Proponents classify this as an ecocentric approach, calling for "the protection of biodiversity for biodiversity's sake" (Soulé, 2013), forming the normative postulates of sciences such as conservation biology (Piccolo, 2017), but also referring to more instrumental cases based on scientific evidence that biodiversity underpins ecosystem functioning in ways that are essential for human cultures and economies.

The nature protection pathway draws on conservation science, providing an evolutionary-ecological view of socio-environmental systems that emphasizes the central importance of biological diversity to ecosystem functioning (Miller *et al.*, 2014). Some important related insights from conservation science include the importance of keystone species, including the role of top predators and grazers in trophic cascades (Estes *et al.*, 2011), the problems arising from habitat fragmentation (Fahrig, 2003) such as the accelerated occurrence of zoonosis (Morand & Lajaunie, 2021), and ecological networks (Montoya *et al.*, 2006). This evolutionary and genetics informed view of the nature crisis underpins the case for protection of biological diversity to be seen as a goal in itself – what Pereira *et al.* (2020) classify as protecting *'nature for nature'*. If protecting nature is only framed in terms of protecting what directly benefits

humans (protecting nature for society), this will lead to failure to protect what is necessary for ecological functioning (for example large predators) and an anthropocentric worldview that further separates humans from nature will be strengthened. On a more instrumental note, there is strong evidence that biodiversity often supports ecosystem functioning in ways that lead to greater productivity and stability of nature's benefits for humans, including resilience to climate change (Cardinale *et al.*, 2012; IPBES, 2019; Naeem *et al.*, 2012).

Saving biodiversity for biodiversity's sake is thus argued to have a stabilizing effect on ecosystem functioning (Loreau *et al.*, 2021) and the secondary benefit of being the best way to ensure a future for humans. This "biodiversity first" perspective accepts evidence for the correlation between biological and cultural diversity (Maffi, 2001) but interprets this as an additional argument for the primacy of saving biodiversity. In this reading, biodiversity is foundational for cultural diversity (with local coevolution less significant) and should be the priority: loss of biodiversity is not only a potential cause of economic decline and instability, but also of degrading cultural and spiritual life. In terms of intergenerational justice, biodiversity – the variety of life – should be valued because humanity cares about future people and the "option value" that biodiversity bestows on them (Faith, 2021).

Role of values and valuation of nature

Nature protection is unique amongst the four pathways described here in its emphasis on human-nature values, with only limited association of these to human-human values. Care and empathy for nature are foreground whilst social values such as justice are not unimportant, but (in the pursuit of a sustainable future) are secondary and separable. This focus on human-nature sustainability-aligned values can be illustrated through two areas of major debate, one about whether conservation should prioritise poverty alleviation and one about whether conservation is best served by sharing or sparing nature.

The conservation-poverty nexus, partly based on geographical overlap between biodiversity and poverty in the tropics, has driven a marked shift from ecocentric to anthropocentric conservation. The Brundtland report characterised poverty as an instrumental constraint on conservation (Adams *et al.*, 2004; United Nations, 1987) whilst later initiatives such as the Conservation Initiative on Human Rights presented a more normative case that conservation must be pro-poor (Fisher *et al.*, 2020). The linking of poverty and conservation goals became embedded in conservation policy through the 2003 World Parks Congress and the subsequent Durban Action Plan that included targets for protected areas to reduce poverty (Fisher *et al.*, 2020). The idea of "integrated conservation and development" gained wide support among donors and practitioners and a survey of nearly 10,000 conservation professionals found that 94.7% were in favour of people-friendly conservation (Sandbrook *et al.*, 2019).

Advocates of a nature protection pathway propose that poverty and biodiversity loss are separate problems (Adams *et al.*, 2004) that are best addressed through separate policy domains. They argue that treating poverty (social justice) and conservation in tandem deflects from the primary evolutionary-ecological goal of saving the genetic variety of life on earth (Miller *et al.*, 2014; Redford *et al.*, 2008; Soulé, 2013). Looking beyond debates about poverty, there is a broader opposition to leaning on an economic rationale for conservation that shares some of the concerns held by degrowth scholars. This position is strongly opposed to green economy thinking, because it is seen to compromise conservation science by leaning towards saving only what humans directly value, or can put a price on, and because it tends to consider continued growth in material consumption to be a good thing.

The second debate is about the need for separating humans from nature and indeed about how much nature needs to be protected from humans. The "half earth" proposal argues that devoting half of the planet to nature protection is needed if the aim is to save sufficient biological diversity (Wilson, 2016), a case disputed by those who emphasize the prospective injustices of expanding protected areas in this way, the colonial origins of this worldview, and who draw on evidence for alternative models (including biocultural and degrowth) for more ethical relationships with the earth (Büscher *et al.*, 2017; Büscher & Fletcher, 2019; Kothari, 2021).

Main policy proposals

The nature protection pathway overlaps considerably with degrowth and earth stewardship in its critique of dominant political-economic ideologies that prioritise consumption growth. Consumption, together with population growth, is seen as a key driver of ecological decline, leading to land use expansion and intensification, habitat fragmentation, climate change, invasive species, over-exploitation and degradation. It differs however in the extent to which ecological sustainability is linked to social justice, tending to argue that they are best addressed as separate problems. For conservation, the key policy response will then be the saving of nature through expanded networks of protected areas, in ways that restore balance between the needs of humans and the needs of non-human nature. Elements of this position can be seen in the draft document of the upcoming Post-2020 Global Biodiversity Framework, including what has so far been proposed as Action Target 1 for 50% of land and sea to be under planning systems that retain existing wilderness areas by 2030, and Action

Target 2 to have 30% of the planet under protected areas or OECMs by 2030. Whilst less radical than the "half earth" call, this "30% by 2030" policy is still proving contentious, with fears that it will conflict with the need to recognise local histories, land rights and values.

5.5.6 Summary: comparative analysis of pathways

Pathways such as green economy, degrowth, earth stewardship and nature protection embody distinct and sometimes contested approaches to mobilizing values of nature for transformations to just and sustainable futures. Scenarios of just and sustainable futures show that sustainable futures are aligned with particular balance and diversity of values (see 5.2). Mobilizing sustainability-aligned values involves changing values but also enabling values to be expressed, acted upon and institutionalised (see 5.3). Analysis of pathways reveals a key-way in which this is pursued in practice, through the development of bodies of science and practice that help to give traction to calls to diversify or balance those values that are recognised, measured and incorporated into institutions and policies.

The pathways presented here show that the global conservation and sustainability community is diverse and characterised by strong and healthy debates about how to achieve shared goals for stopping the loss of biodiversity and ensuring human flourishing within and between generations. **Figure 5.16** shows the generalised positions of the four selected pathways in relation to three core positions identified in the Nature Futures Framework and in the IPBES typology of instrumental, intrinsic and relational values of nature. Whilst green economy, nature protection and earth stewardship pathways are shown as aligned most closely (though not exclusively) with one of these positions, degrowth is more cross-cutting, arguably having more fundamental overlap with earth stewardship (e.g., the call for localisation and knowledge pluralism) but also sharing with nature protection (e.g., the rejection of nature commodification) and with green economy (e.g., reforms to taxation and performance metrics).

Pathways stem from different disciplinary and theoretical traditions, as well as from different actors, leading to their own particular bodies of knowledge intersecting with values. The Green economy pathway prioritises the measurement of instrumental values of nature as a means to implement market-based approaches to sustainability. Earth stewardship draws on both sustainability science and local knowledge to develop a biocultural conception of value that places greater emphasis on relational values rooted in local territories and more community-oriented approaches to sustainability. Nature protection draws on conservation science knowledge about the fundamental importance of protecting the diversity of life on earth, intersecting with an

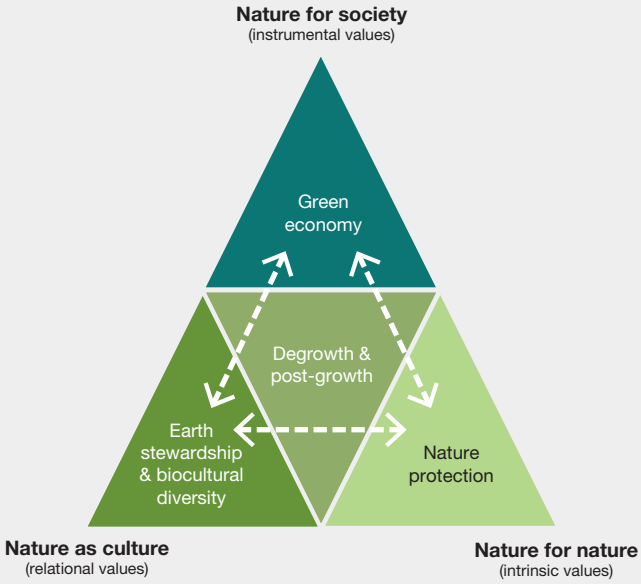


Figure 5 16 **Selected pathways in relation to Nature Futures Framework (Pereira et al., 2020) and IPBES values typology.**

Arrows denote that pathway positions are not absolute but overlapping.

ethic that humans have a duty to other species to make this happen. Degrowth is another distinct body of knowledge and values, prioritising material limits and redistribution, recognising the more biocultural perspective on values but also the need for market reforms.

These four pathways all accept that biophysical boundaries have to be respected, albeit with different views about, for example, whether there is still scope for economic growth within these boundaries. All pathways also pay attention to social justice, especially between generations, albeit that the nature protection pathways views this as a separate goal that is secondary and derivative to saving biodiversity, whilst other pathways see degrees of integration between justice and sustainability. Pathways also emphasize different justice principles such as maximising utility (green economy), minimum and maximum consumption thresholds (degrowth), rights and empowerment (earth stewardship) and option values (nature protection). Above all, each pathway strongly advocates the need to recognise and enact more diverse values of nature as a foundation for transformative change.

Each of these pathways has much to offer. All foreground sustainability aligned values and all seek a more balanced future for nature and people. Matching paths to selected or specific opportunities will become a critical task if shifts towards just and sustainable futures begin. No single path is presented here as superior over the others, although much of the literature reviewed does make the case for one pathway[15]. And whilst some crucial common goals are highlighted, there is no agenda to resolve all conflicts between pathways and eliminate differences. Constructive dialogue between these and other pathways, based on transparency and recognition of the diverse values underlying different positions, and of the relationship between knowledge and values in pathway formation, will itself be crucial to transformative change.

15. Role of values in transformational change (https://doi.org/10.5281/zenodo.4363069).

5.6 CONCLUSION

This chapter assesses the role of nature's diverse values in supporting socio-ecological transformations toward more just and sustainable futures. A two-fold approach was followed, assessing the diverse values that have been considered in developing and creating visions for, and scenarios of the future, particularly those relating to more just and sustainable futures; and assessing how interventions to mobilize more diverse values and valuation of nature can serve as leverage points for enabling and governing transformation towards just and sustainable futures. This chapter highlighted the substantial and well-established body of specialised literature on visions and scenarios of socio-ecological futures, within the scientific literature, grey literature and those captured within the arts. It also presents the relatively recent literature on transformations and transitions to sustainability. These reviews and analyses are complemented by expert-led case studies that explore the role of values and valuation in four alternative pathways of transformation: green economy, degrowth, earth stewardship, and nature protection.

Futures thinking and its different types of approaches and methods such as scenario planning are powerful tools that can be used to learn about personal and shared values and to motivate value-inclusive decision-making. The review highlights that certain value mixes will likely result in more just and sustainable futures compared with others. The value mix within the dominant global discourse or business as usual (as it relates to trade, business and environment) will not lead to just and sustainable outcomes in the future. If a just and sustainable future is to be achieved, then this value mix (which is connected to decision-making and actions) needs to change. By grouping studies according to seven different future archetypes, the chapter demonstrates that just and sustainable futures are characterised by a strong societal focus and a balanced pursuit of material and non-material benefits.

The majority of futures studies address nature, nature´s contributions to people, and good quality of life as separate issues, and the majority of this work has been carried out within research and academic contexts. Quantitative assessments of values were mostly carried out in identifying economic values. In contrast, qualitative studies defined futures underpinned by multiple types of values. Studies that explicitly address multiple types of values primarily investigated local scales, and there were few such studies with a global context. Stakeholders were included in the development of approximately half of the futures, however, little information is available on whose values were explicitly incorporated in these studies.

While the envisioned futures encompassed various geographic and temporal scales from local to continental,

and years to millennia, the coverage of futures from selected regions, particularly Africa, and futures covering marine environments, is poorly developed, so too is the understanding of cross-scale interactions and trade-offs.

The reviews of futures research revealed that sustainable future scenarios are associated with more diverse and balanced values. The set of values that predominate in society contributes to shaping the kind of futures that are possible. If society is to transform towards sustainability it will need to embrace values that are aligned with this future. Research on transformative change has recently begun to explore the role of values in societal change and focuses on two main processes and possibilities for interventions. Firstly, interventions seek to change individual and shared values, promoting sustainability-aligned values whilst reducing the influence of values aligned with non-sustainability. Secondly, when people already hold sustainability-aligned values but are constrained to act on them due to institutional barriers, interventions seek to create more favourable conditions for mobilizing values, including changes to power relations.

Mobilizing values for sustainability requires interventions that target different strata of society. At the surface level of society, changes to everyday valuation and decision-making can be achieved through more diverse and inclusive valuation methodologies that ensure that can help to change the incentives for everyday choices by individuals and businesses. At the underlying structural level, reforms to institutions can help to scale up and deepen the impact of more diverse and inclusive valuation, operating in ways that change system-wide incentive structures. At the deepest level of all, transformative change requires changes to the broad values and beliefs that underpin decision-making, shifting societal goals and paradigms in ways that predispose decision-making towards justice and sustainability. For example, futures studies commonly find the need to redefine goals of societal progress, away from materialism and individualism and towards the non-material and communal basis for living well. Working with values at each of these levels requires attention to power relations, although changes at the deeper levels, including the goals of society, are likely to require more profound reconfigurations of power due to the incumbent powers that benefit from current regimes.

Mobilizing more diverse and sustainability-aligned values can be encouraged through deliberative processes of knowledge production and decision-making and more research is needed to better understand how these ways of working can contribute to both learning and empowerment for transformative change. It is well known that holding particular values does not necessarily lead to aligned behaviours. Policies for biodiversity conservation can be designed to better “bridge” the gap between values and behaviour by ensuring that various conditions are met. These conditions can be categorised as providing (i) capability, (ii) opportunity and (iii) motivation to act. Currently, many action plans do not explicitly consider or respond to these needs and there is an important opportunity for improvement here.

Evidence assessed in the chapter underlines that value choices, on the nature of society desired to live in and to leave for posterity, are linchpins of governance for just and sustainable futures. The significance of meta-governance elements in setting the values, images and principles as the backdrop to transition towards just and sustainable futures needs recognition as governance choices can become “easy”, “moderate” or “hard” due to (in)compatibility, (in)comparability, and (in)commensurability of values underpinning governance modes. Central to the consideration of diverse values in transformative governance is a multi-actor approach that widens the scope of participation to a broad set of values and beliefs within society and that guarantees effective participation of the involved ones. Creating space and autonomy for local experiences, encouraging innovative interventions, and the emergence of arrangements inclusive of diverse values within systems; creating an environment for questioning existing values, knowledge and structures; and providing opportunities for experimentation with new ways of governance based on knowledge co-creation and social learning processes are key enablers to manifest a transformation. At the same time, barriers to transformation such as the cognitive limits of humans, the inertia of embedded political power relations, and the absence of catalytic upscaling mechanisms for nested personal and social transformations need to be addressed.

The evidence also underlines the significance of social learning processes in enabling governance transformation towards just and sustainable futures. Participatory reflection, decision and action implementation as well as collaborative production of knowledge across different social actors, groups and networks are highlighted as mechanisms that can contribute to the recognition, mobilization, weaving, integration and co-creation of diverse values. Learning with, from and for diverse values of nature that are held by indigenous peoples and local communities can support governance for just and sustainable futures since IPLCs have key long-term place-based knowledge and values of biodiversity.

There is intense debate about the course of action that societies should take in order to advance towards sustainability. There are diverse conceptions of what constitutes a just and sustainable future and equally diverse views about what steps need to be taken to get there. Amidst this diversity, it is helpful to identify substantial alliances of actors around alternative pathways to

sustainability. The examples reviewed here are the "green economy", "degrowth", "Earth stewardship" and "nature protection" pathways. Analysis of these pathways confirms how important values are to the kind of future that people envision and work towards. Green economy is underpinned by the prioritisation of nature's instrumental values, emphasizing the role of nature as an asset that supports human well-being. Degrowth is underpinned by values of sufficiency and egalitarianism for shaping human balance with nature. Earth stewardship is underpinned by relational values linked to biocultural diversity, alongside broad values like solidarity and reciprocity among humans and between humans and nature. Nature protection is underpinned by intrinsic values of nature, particularly concerned with the inadequacies of an instrumental basis for protection.

Each of these reviewed pathways advocates some form of more plural valuation of nature as a basis for sustainability. This finding confirms that recognition and incorporation of a more balanced set of values of nature should be a key part of efforts to move towards living in harmony with nature. Matching pathways to selected or specific opportunities will become a critical task if society starts making shifts towards just and sustainable futures. No single path is presented here as superior over the others. And whilst some crucial common goals are highlighted, there is no agenda to resolve all conflicts between pathways and eliminate differences. What is crucial is the openness and attentiveness to the diversity of values and associated pathways, harnessed within more deliberative and inclusive forms of governance that support social learning and knowledge co-production.

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Chapter 6

POLICY OPTIONS AND CAPACITY DEVELOPMENT TO OPERATIONALIZE THE INCLUSION OF DIVERSE VALUES OF NATURE IN DECISION-MAKING[1,2]

COORDINATING LEAD AUTHORS:
Eszter Kelemen (Hungary), Suneetha M. Subramanian (India/ United Nations University Institute for the Advanced Study of Sustainability), Barbara Nakangu (Uganda/World Wildlife Fund)

LEAD AUTHORS:
Mine Islar (Türkiye /Sweden), Marina Kosmus (Argentina/ Germany), Emmanuel Nuesiri (Cameroon/Nigeria), Luciana Porter-Bolland (Mexico), Alta de Vos (South Africa)

FELLOWS:
Sacha Amaruzaman (Indonesia), Evonne Yiu (Singapore)

CONTRIBUTING AUTHORS:
Sara Breslow (United States of America), Ebba Brink (Sweden), Maral Dadvar (Islamic Republic of Iran), Lucy Emerton (United Kingdom of Great Britain and Northern Ireland), Ellen Guimaraes (Brazil), Raffaela Kozar (United States of America), Torsten Krause (Sweden), Tamás Kocsis (Hungary), Melissa Mayhew (Canada), Aroha Mead (New Zealand), Yoko Mochizuk (Japan), Aidin Niamir (Islamic Republic of Iran), Jessica Perritt (Canada), Martin Schlaepfer (Switzerland), Anna Varga (Hungary), Ágnes Zólyomi (Hungary)

REVIEW EDITORS:
Simon Anderson (United Kingdom of Great Britain and Northern Ireland), Joji Cariño (Philippines)

TECHNICAL SUPPORT UNIT:
Gabriela Arroyo-Robles

1. This is the final text version of Chapter 6.
2. Authors are listed with, in parentheses, their country or countries of citizenship, separated by a comma when they have more than one; and, following a slash, their country of affiliation, if different from that or those of their citizenship, or their organization if they belong to an international organization. The countries and organizations having nominated the experts are listed on the IPBES website (except for contributing authors who were not nominated).

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Annex 6.2 Policy instruments and international initiatives
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Annex 6.4 Operationalization

Chapter **6.**

POLICY OPTIONS AND CAPACITY DEVELOPMENT TO OPERATIONALIZE THE INCLUSION OF DIVERSE VALUES OF NATURE IN DECISION-MAKING

EXECUTIVE SUMMARY

Embedding the diverse values of nature into decision-making involves a better recognition of the values held by different stakeholders and their consideration in decisions on use and management of natural resources. These values depend on stakeholders' worldviews, socio-cultural-environmental contexts, and the scale at which they operate. Consequently, possibilities for mismatches or concurrence between priorities of stakeholders arise in decisions relating to the use and management of nature that can impede or facilitate effective policy implementation. *Considering, weaving, co-creating, and integrating nature's diverse values into policies and decisions helps achieve just and sustainable futures.* Different assumptions, interests, sources of evidence, values (including those related to nature) and implementation tools influence choices of action of policymakers. Therefore, understanding how to operationalise the integration of the values of nature into policy decisions could lead to better outcomes for biodiversity and human well-being.

The overarching objective of Chapter 6 is to provide options which enable a system wide transformation towards just and sustainable futures by incorporating nature's diverse values in decisions made by diverse actors. Four specific goals have been identified as part of this overall objective: (1) to assess how the values of nature are incorporated in policy instruments, in valuations supported by decisions and in biodiversity-related initiatives {6.2}, (2) to identify policy options within and across sectors that engage with diverse values of nature for transformative change {6.3}, (3) to highlight existing gaps and challenges and identify capacity development needs and options {6.4}, and (4) to guide the operationalization of nature's diverse values in decision-making {6.5}.

To achieve these goals, Chapter 6 assessed evidence from different sources, including secondary assessment of literature reviews of preceding chapters and the IPBES Global Assessment {6.2, 6.5}, systematic searches of cross-national initiatives {6.2}, systematic and targeted literature reviews {6.3, 6.4 and 6.5}, structured information collated from the preceding chapters of the *values assessment* {6.4, 6.5}, and in-depth analysis of place-based case studies {6.3}.

1 **Incorporation of diverse values of nature into decisions is currently limited within existing policies and policy instruments *(well established)*.** The priorities of different actors are included/excluded to different degrees when valuing nature for decision-making, depending on power asymmetries, representativeness, and socio-cultural factors, that are further limited by methodological constraints that cannot easily account for diverse values {6.2.1}. Understanding and identifying these limitations can help resolve mismatches between the multiple ways in which people value nature. Representation of stakeholder priorities can ensure the inclusion of diverse values in decision-making, which increases the potential to achieve just and sustainable outcomes {6.2.3}.

2 **Choosing a narrow set of values in decision-making is more likely to limit the opportunities for transformative change and sustainable futures *(established but incomplete)*.** Operationalizing diverse values of nature in decision-making requires considering different needs, purposes, processes, capacities, tools, policies, decisions and knowledge systems of multiple stakeholders. This further helps achieve Sustainable Development Goals {6.5}. A progressive shift from a narrower to a more pluralistic values approach can already be recognized in several sectors and cross-sectoral initiatives (e.g., health, agriculture, conservation, and education) {6.3}. However, discrepancies exist between how (multiple) values of nature are framed at global level, and how they are operationalized on-the-ground owing to variations in political, economic, and socio-environmental factors that limit achieving the different policy goals {6.5}.

3 **Policy instruments, that address the direct and indirect drivers of biodiversity loss, embed diverse values, stimulate institutional change, promote**

capacities, and are being implemented in an adaptive way across different sectors, have the highest potential to enable system-wide change towards sustainability *(well established)*. Options exist in all four types of policy instruments (n=37 assessed): *Alternative economic models* (e.g., concepts like *Buen vivir* or degrowth) and *measures for economic growth* (e.g., Gross Happiness Index) are the most promising examples for economic and financial instruments (out of 13 instruments assessed in this type) {6.2.2, 6.3.3}. *Rights of nature* is outstanding for legal and regulatory instruments (out of 13 instruments assessed in this type) {6.2.2}. *Indigenous Community Conserved Areas* and *Other Effective Conservation Measures* are prominent examples for rights-based and customary instruments (in total four different instruments were assessed in this group) {6.2.2, 6.3.1.4}. *Co-management regimes* are the most promising among social and cultural policy instruments (out of seven instruments assessed in this type) {6.2.2, 6.3.1.4}. The transformative potential of policy instruments is highly dependent on how a given instrument is designed and applied in a specific context. Policy instruments that have been able to facilitate system-wide changes often use valuation methods and policy support tools in ways that allow for broader and more diverse engagement {6.2.2, 6.2.3}.

4 Socio-cultural, and customary-rights-based policy instruments, which show higher potential to operationalize diverse values than economic and legal instruments, are used to a limited extent in existing governance approaches *(well established)*. Based on the assessment of 61 studies (some of them referring to more than one policy instrument), we found that among policy instruments that support transformative governance approaches, legal-regulatory (addressed in 82% of all studies assessed) and economic instruments (addressed in 37.7% of all studies assessed) are more frequently mentioned than socio-cultural (addressed in 18% of all studies assessed) or customary and rights-based instruments (addressed in 8.2% of all studies assessed) {6.2.2, 6.2.3}. As a group, these policy instruments engage multiple stakeholders, diverse values and knowledge systems, that support transformative governance approaches. By not utilizing them adequately, the potential to arrive at more inclusive and sustainable solutions are not sufficiently explored. To overcome this limitation, socio-cultural, and customary-rights-based policy instruments can be applied in combination with more frequently used legal and economic tools, as part of a policy mix.

5 Biodiversity-centered initiatives at multiple scales (e.g., United Nations and Organisation for Economic Co-operation and Development bodies, development agencies, global partnerships and science-policy interfaces, and non-governmental organizations) could act as bridging organizations or brokers of knowledge and values of nature *(well established)*. Biodiversity-centered initiatives can foster the integration of diverse values into decisions relative to land use, ecosystems management, climate information services, investments in infrastructure, etc., through their capacity development, knowledge management, policy advocacy and stakeholder engagement activities {6.2.3}. Still, diverse values are more prominent in international biodiversity-centered initiatives, than in place-based implementation cases. The assessment of 46 international biodiversity-centered initiatives highlighted that their majority (91%) explicitly foster the use of policies and policy support tools to incorporate the diverse values of nature in governance. However, the analysis of place-based projects linked to the same initiatives indicated that only 23% of the place-based projects addressed intrinsic, instrumental, and relational values, 39% addressed two value dimensions, while the rest (37%) addressed only one value dimension. Positive association was found between the number of values that an initiative addresses and the number of transformative criteria met by the initiative, suggesting that incorporating diverse values in decision-making is a key aspect of transformative governance {6.2.3}.

6 Decision-making at different levels can be influenced to include and recognize nature's diverse values and nature´s contributions to people via specific and targeted sectoral and cross-sectoral policy options that cut across multiple interests and stakeholder priorities *(established but incomplete)*. For instance, policy options, such as swidden/agro-ecological farming, integrated approaches such as One Health and community health approaches, or biophilic urban planning offer robust and replicable processes towards sustainability. The assessment of these progressive policy options also indicates that including the well-being priorities of multiple actors enables more sensitive policy design and implementation {6.3}. New and emerging policy options and instruments *inter alia* Nature-based solutions, Ecological Disaster Risk Reduction, and Ecosystem-based Approaches focus on multifunctionality and inclusion of multiple perspectives of diverse actors. However, caution is needed to ensure that the catch-all phrasing does not dilute support for biodiversity and inclusion of voices of indigenous and local knowledge holders {6.3}.

7 International initiatives in the field of economics support the policy uptake of valuation by providing guidance on robust and relevant use of available valuation methods *(well established)*. International initiatives to mainstream economic valuation, e.g., The Economics of Ecosystems and Biodiversity (TEEB), or the Wealth Accounting and Valuation of Ecosystem Services (WAVES) Global Partnership Program, among others, have contributed to capacity development and the improved use

of economic valuation methods in policy decision support {6.2.3}. These initiatives recognize one or more types of values related to nature, while the tools they offer capture primarily the instrumental values associated with nature and consider trade-offs when there are winners and losers associated with a policy action {6.2.3}. They provide options to an improved policy uptake of economic valuation, which help create enabling conditions for more in-depth, system wide changes. However, there are other opportunities (i.e., engaging diverse knowledge systems, balancing different values perspectives, cross-scale interactions, and social learning) to effectuate sustainability-aligned values in the economic system {6.5}. Alternative economic paradigms that expand on dominant ways of measuring values – e.g., degrowth, steady state economics or care economics that include intrinsic values of nature – suggest that to avoid the future deterioration of the environment and human well-being, a shift from the mainstream, growth oriented economic paradigm is needed, which can only be achieved if individual behaviour and the institutional system is changed in parallel {6.3.2.3}. Treating material, social, spiritual and mental well-being as equally important – and accepting nature's diverse values – is a prerequisite for such a transformation {6.3.2.3}. However, there is yet only limited evidence on the place-based implementation of these alternative economic models.

8 Knowledge and operationalization gaps limit the opportunities to integrate nature's diverse values into decisions *(established but incomplete)*. There are key data and research gaps (called together as knowledge gaps) and resource, information, and capacity gaps (called together as operationalization gaps) regarding the role of values and valuation in decision-making. These are particularly significant on valuation uptake in the decision cycle {6.2}. Examples of these gaps relate to limitations of global research programmes and data gathering efforts in understanding the ways of valuing the diverse values of nature in some contexts, cultures and across different generations or gender {6.4}. Limitations also exist in understanding the valuation approaches used by indigenous peoples and local communities, and in turn, this restricts the recognition and consideration of their values in decision-making {6.4}. Further knowledge gaps exist in the understanding of how the values of actors with different worldviews and social roles are expressed in decision-making. The lack of available literature limits the unravelling of underlying correlations, such as gender inequalities relative to the values of nature {6.4}. Values accounted for in future scenarios and the potential of valuation to address justice and power issues along sustainable pathways could also be further explored {6.4}.

9 Operationalizing diverse values of nature into policy decisions is more likely to occur when private and public actors have the capacities to do so *(established but incomplete)*. Six capacity dimensions were identified which differentially address current barriers to integrate nature's values into decisions {6.1.2.4, 6.4.4}. *Motivational capacities* ensure that there is awareness of, and desire to, consider diverse values in decisions. These enhance the likelihood of actors developing positive attitudes and behaviour towards nature {6.4.4.1}. *Analytical capacities* enable selecting and using suitable tools to acquire and synthesise all necessary information on values and valuation {6.4.4.2}. *Bridging capacities* entail facilitation, learning and reflection skills, and provide a pluralistic value perspective to problem-oriented decision-making by bringing together different ways of knowing and fostering social learning processes {6.4.4.3}. These three types of capacities allow the diverse values of nature to be recognized and understood by all relevant actors taking part in decision-making. However, to effectively guarantee that nature's diverse values are mainstreamed into decision-making, three additional capacities need to be considered. *Negotiation capacities* entail being able to represent one's own interests, to make compromises, and to accept the views of others. By enhancing such capacities, more robust uptake of valuation results is likely to occur, especially when broadening the process of negotiation towards building relations and cooperation {6.4.4.4}. *Social networking capacities* include coordinating across scales and different social groups, managing expectations and risks, adapting, and acting. They can also offer social mechanisms to complement, or in certain cases even replace, some formal rules and standarization in governance decisions {6.4.4.5}. Finally, governance capacities refer to the ability to make accountable, encompassing, transparent, participatory, and law-abiding decisions. These capacities are important to ensure that fair institutions can be created to incorporate more diverse values of nature in an explicit and legitimate way {6.4.4.6}.

10 Capacity development, if carried out as an interactive and context specific process that evolves over time and leads to shared outcomes, offers opportunities to overcome the challenges emerging from knowledge and operationalization gaps *(established but incomplete)*. Capacity development, as a process of co-learning between different stakeholders, can help transform top-down policy processes (the business-as-usual scenario) by enlarging the set of knowledge decisions are built on, and by acknowledging a wider range of values of nature {6.4.4}. This is also underlined by evidence on successful policy uptake cases, indicating that more progress was achieved towards transformative governance in cases where policy development and implementation were approached as a learning activity {6.2.2}. Co-learning approaches also enhance the reliability of the understanding of status, trends, drivers and impacts on nature and nature's contribution to people and help identify workable policy options {6.3.2.2}.

11 **Educational approaches have developed pedagogical principles and methods oriented towards sustainability *(well established)*.** Sustainability aligned pedagogical principles and methods shift from merely individual learning situations towards situations enabling social and experiential learning that inherently tackles challenges in understanding and managing socio-ecological systems, that involves sensitization of "learners" to diverse values of nature and priorities of actors in different contexts. These approaches call for transformative processes to be fostered in societies that build on different worldviews and contexts. That said, the adoption of such methods is still not widespread, although where adopted, multiple benefits to the environment and economy have been noted {6.3.2.2, 6.4.4}.

12 **The diverse values of nature can be integrated into real life decisions through a dynamic process which realize, accept, and respect different values, and "weave" them together for just and sustainable futures following a set of guidelines *(established but incomplete)*.** Guidelines for the operationalization of nature's diverse values in real life decisions include: (i) contextualize the social, economic, cultural and political decision-making framework and the diversity of stakeholders, (ii) design policies which take into account differentials in power, capacity, knowledge and perspectives of stakeholders to promote justice, (iii) represent diverse stakeholders and knowledge holders to reflect on diverse worldviews and values, (iv) engage interactively to promote co-creation and co-learning, (v) be driven by impact focusing on co-owned results, and (vi) reflect, learn and sustain practices, processes and outputs by linking them to aspirational futures and change pathways {6.5.5.2}.

13 **Options for actions to operationalize diverse values will strongly depend on the specific context where the action takes place, considering different actors, stakeholders, their capacities, needs and specific type of social interactions and institutional framework, that could promote or hinder the uptake of diverse values in decision-making, policy design and implementation *(established but incomplete)*.** Figure 6.1 summarizes the characteristics, interventional levels, actors and actions to take under different decision-making contexts, from more contested to more enabling context {6.5.3}.

14 **Achieving the SDGs and progressing towards just and sustainable futures requires a shift in decision-making to better recognize the values of nature, both at the level of institutions and individuals *(established but incomplete)*.** Considering nature's diverse values helps to identify, address and balance trade-offs, understand the people that are behind them, and design more inclusive strategies to better address the needs of different actors for just and shared sustainable futures. Diverse values approaches can also help enhance policy coherence and equity. Six values-centred action points were identified to highlight where and by whom concerted action is possible towards more just and sustainable futures {6.5.2}. These include: (i) Recognizing the diverse values of nature and operationalizing them in decision-making; (ii) Improving policy coherence across sectors and scales around sustainability aligned values; (iii) Ensuring meaningful representation of stakeholders and diverse values; (iv) Enabling capacities to mainstream values into decisions; (v) Co-learning and improved and transparent communication among stakeholders to develop shared values; (vi) Mobilizing resources for plural valuation and uptake.

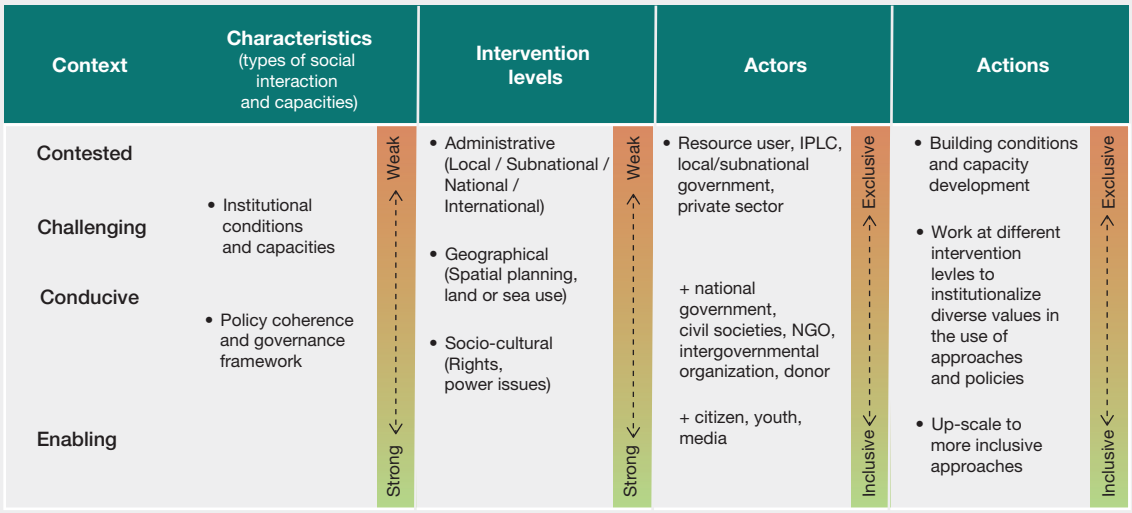


Figure 6 1 **Operationalizing diverse values in different contexts: from more contested to more enabling.**

15 Transformative governance calls for cross-sectoral thinking and synergistic planning approaches *(established but incomplete)*. Sectoral and cross-sectoral approaches, including landscape management, multi-stakeholder platforms at different levels, new urban planning paradigms, alternative policies in agriculture and conservation, climate adaptation and mitigation strategies, and health and education, offer opportunities to reconcile multiple interests, values and norms while recognizing trade-offs and uneven power relations between stakeholders {6.2, 6.3}. **Table 6.1** summarizes available options for decision-makers across some key sectoral and cross-sectoral areas of intervention.

Table 6 1 **Examples of options for decision-makers, which incorporate the values of nature into decisions and therefore enable incremental or transformative change for just and sustainable futures.**

Sectoral and cross-sectoral areas of intervention	Examples of options available for different stakeholders
Climate change adaptation and mitigation	• Nature-based solutions **(NSG, P, NGO, CG)** 🟢 • Ecosystem-based approaches **(NSG, P, NGO, CG)** 🟢 • REDD+ **(IO, NSG, NGO)** 🟠 • Tradable permits **(NSG, IO)** 🟠
Economy	• Alternative economic measures **(IO, NSG)** 🟢 • Alternative economic models including degrowth and steady state economics **(NSG)** 🟢 • Sustainable production and consumption **(P, CG, NGO)** 🟠 • Circular economy **(NSG, P, CG)** 🟠 • Ecological fiscal transfers **(NSG)** 🟠 • Taxes on consumption **(NSG)** 🟠 • Ecosystem accounting **(NSG, P, IO)** 🟠 • Socially responsible investments **(CG, P)** 🟠 • Biodiversity relevant taxes, charges and fees **(NSG)** 🟠 • Commodity chain regulation **(NSG, P)** 🟠
Education	• Social learning (IO, NSG, P, NGO, CG) 🟢
Health	• Planetary Health approaches **(IO, NSG)** 🟢 • One Health approaches **(IO, NSG)** 🟢 • EcoHealth approaches **(IO, NSG)** 🟢 • Community health approaches **(IO, NSG)** 🟢 • Biophilic landscape planning **(NSG)** 🟢 • Legislative control over pesticide use **(NSG, IO)** 🟠
Land use (incl. agriculture and nature conservation)	• Swidden agriculture **(CG, P)** 🟢 • Rights of nature **(NSG, NGO)** 🟢 • Payments for ecosystem services **(IO, NSG, NGO, P)** 🟠 • Biodiversity financing **(IO, NSG, NGO)** 🟠 • Commodity chain regulation **(NSG, P)** 🟠 • Trade bans **(NSG, IO, P)** 🟠 • Legal restrictions on natural resource use **(NSG)** 🟠
Marine, coastal and fisheries management	• Rights of nature **(NSG, NGO)** 🟢 • Marine spatial planning **(IO, NSG)** 🟠 • Marine protected areas **(IO, NSG)** 🟠 • Locally managed marine areas **(NSG, NGO, CG)** 🟠
Urbanization and other large-scale infrastructure development	• Nature-based solutions **(NSG, P, NGO, RU)** 🟢 • Ecosystem-based approaches **(NSG, P, NGO, CG)** 🟢 • Biophilic planning **(NSG, CG)** 🟢 • Ecological fiscal transfers **(NSG)** 🟠

Key change agents highlighted with acronyms:

- **IO**=intergovernmental organizations,
- **NSG**=national and subnational governments,
- **P**=private actors,
- **NGO**=non-governmental and civil society organizations,
- **CG**=citizen groups including (e.g., women, IPLCs, the youths etc.)

Colours refer to transformative (🟢 green) or incremental (🟠 orange) potential, while the orange options highlight those which rather maintain the status quo.

6.1 INTRODUCTION

6.1.1 The rationale and mandate of this chapter

Moving towards just and sustainable futures has found more acceptance across a broad range of stakeholders. This has been further catalysed by the COVID-19 pandemic, which highlighted the interconnectedness of environmental health with the health and well-being of humans and of all other species (IPBES, 2020; Settele *et al.*, 2020), and showed the inequities within societies that need to be overcome to ensure the mandate of *'no one is left behind'* that the Sustainable Development Goals advocate. The urgency to transit towards sustainable futures has been emphatically stated in various assessments (IPBES, 2019b; SCBD, 2020; WWF, 2020), and these further indicate that a "transformative change" towards sustainability is required, a change that implies radical and system-wide changes to the way we operate politically, economically and socially in our interactions with nature (Bulkeley *et al.*, 2020; IPBES, 2019b; SCBD, 2020). Governance has a critical role to play in transformative change, at least from three aspects: (i) governance can create enabling conditions which make room for systemic changes to emerge; (ii) governance can stimulate and lead the process of transformation; and (iii) to support the first two roles, governance itself can be transformed (i.e., governance regimes might need to go through a transformative change; Burch *et al.*, 2019).

In the previous chapters of the *values assessment* the conceptual and methodological foundations of the diverse values and the plural valuation of nature has been laid down, uptake of valuation results in decisions has been analysed, and pathways for more just and sustainable futures have been assessed through a values-lens. The aim of this closing chapter is to *provide policy options which enable a systemic change towards just and sustainable futures by incorporating the nature's diverse values in decisions* made by diverse stakeholders[3]. To achieve this overarching aim, the specific objectives of Chapter 6 are:

- to assess how the values of nature are incorporated in currently available policy options (see 6.2);
- to identify policy options – both for specific sectors and cross-sectoral initiatives – which are able to trigger transformative change by incorporating nature's diverse values in decisions (see 6.3);
- to highlight existing gaps and challenges, and to identify capacity development needs and options for different stakeholders (see 6.4); and

3. This closing chapter of the values assessment was originally requested to explore capacity building needs and steps to respond to those needs, by building on the preceding chapters (IPBES/4/9, Scoping Document). The three key areas of analysis mandated to Chapter 6 were: (i) the explicit acknowledgment of the different types of conceptualizations of nature and its benefits; (ii) the different types of valuation methodologies and approaches that are needed to reflect them; and (iii) their explicit incorporation into decisions and policymaking at different levels and within different contexts. All these aspects are addressed here and in preceding chapters of the assessment but the scope of Chapter 6 has been expanded to respond to external review comments requesting further guidance for various decision-makers on the operationalization of the diverse values of nature in decisions, which is considered as a key component of transformative change as the IPBES Global Assessment highlighted.

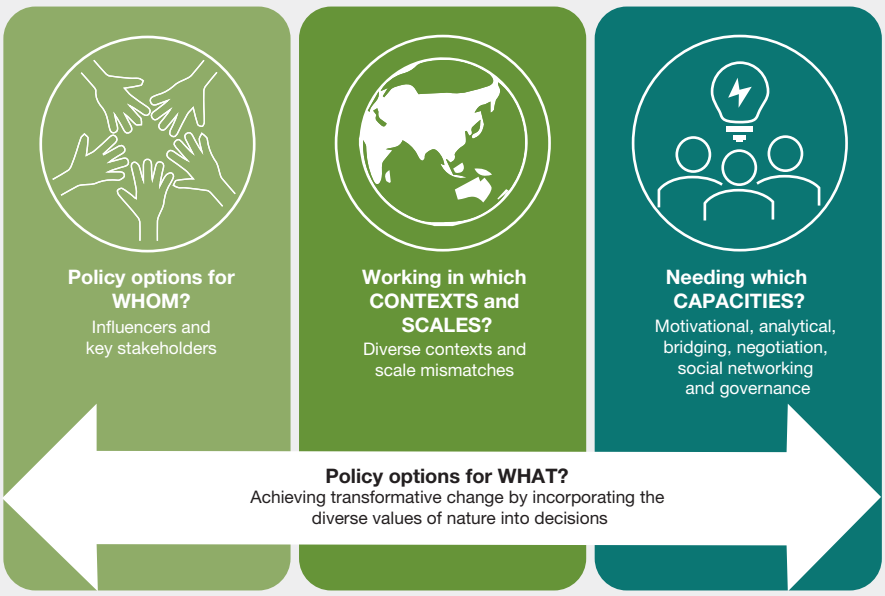


Figure 6 2 **The leading questions of Chapter 6.**

Box 6 1 How "policy options" are understood in Chapter 6.

Policy options are understood in this chapter as a combination of available policy support tools and policy instruments which can be applied in specific contexts and at given scales in a tailor-made manner. Policy support tools and policy instruments are defined here according to the IPBES Catalogue of Policy Support Tools and Methodologies (IPBES, 2017).

Policy support tools include approaches and techniques which are used to inform, support and improve policy decision-making and implementation at various scales (from the local to the international), focusing on the use and protection of nature. Policy support tools can build on various knowledge systems (including both scientific knowledge and ILK), and can provide assistance in assembling data, assessment and evaluation, engagement, policy instrument design, policy implementation and enforcement, capacity building and social learning.

Policy instruments are understood as the different interventions (formal rules, laws, social norms and processes etc.) made by decision-makers (governments and public authorities, intergovernmental organizations, companies etc.) to ensure that policy objectives are supported and achieved by influencing the behaviour of other stakeholders (Bemelmans-Videc *et al.*, 1998; Persson, 2006). The IPBES catalogue differentiates among four different types of policy instruments (IPBES, 2017): (i) economic and financial instruments (financial incentives handling out or taking away economic resources), (ii) legal and regulatory instruments (formal rules, laws and regulations), (iii) rights-based instruments and customary norms (including human and collective rights as well as customary norms and institutions of indigenous people), and (iv) social and cultural instruments (information-based instruments and voluntary or collective actions with an emphasis on the intertwined relationships between ecosystems and sociocultural dynamics).

- to provide guidance on the operationalization of nature's diverse values in decision-making across different contexts (see 6.5).

The chapter is guided by four key questions and the related concepts and approaches **(Figure 6.2)**. Through these four questions the aim is to explore how – through which governance processes and by which policy alternatives – is it possible to shift the *status quo* of restricted or limited nature valuation, focusing on the challenges and the available options to explicitly incorporate the diverse values of nature into policy and decision-making. The next subsections explain these guiding questions and the key concepts used in this chapter, based on targeted literature reviews and the interpretation of related concepts as defined in the previous chapters.

6.1.2 Key concepts used in this chapter

6.1.2.1 Transformative governance

International policy processes are making a clear call for re-orienting institutions to foster a complete transformation towards sustainability goals (IPBES, 2019b; SCBD, 2020).

Transformative change realizes the need for the fundamental reorganization of paradigms, goals, and values, which is possible through innovative and holistic approaches to governance (IPBES, 2019a; Pelling *et al.*, 2015; Visseren-Hamakers *et al.*, 2021). Transformative governance can be defined as the approach to governing transformative change that enables *'the capacity to respond to, manage, and trigger regime shifts in coupled socio-ecological systems at multiple scales'* (Chaffin *et al.*, 2016). Transformative governance requires addressing a wide range of political, social, economic, and technological challenges by using the mix of instruments and tools that link across different values, knowledges, sectors, and scales (Göpel, 2016; Kelly *et al.*, 2019; Kivimaa & Kern, 2016; Koh, 2020; Loorbach, 2014). This implies that decision-makers need to carefully consider whose values and worldviews are represented (Beck & Forsyth, 2020). Transformative governance can acknowledge the nature's diverse values by diversifying the range of values; by co-producing values of nature (e.g., through inclusive governance approaches that acknowledge under-represented voices and perspectives regarding sustainability); by institutionalising values at different scales of decision-making; and by acknowledging various levels of societal change, starting from the individual values towards broader, shared values (see Chapter 5, Section 5.3).

Policy options that can support sustainability transformations share some special features[4] (Annex 6.1):

- **They address the *status quo*.** To halt biodiversity loss, policy options need to alter the underlying direct and indirect drivers – i.e., the ecologically harmful policies and their decision-contexts – through social processes and innovations (Colloff *et al.*, 2017; Folke *et al.*, 2010; Förster *et al.*, 2020; Loorbach & Rotmans, 2010; Meadowcroft, 2009).

- **They incorporate diverse values.** Values can be conceived as socio-cultural resources in specific contexts to form views about sustainability goals and processes (Demski *et al.*, 2015), therefore, values

4. Transformative governance within policy instruments and initiatives (https://doi.org/10.5281/zenodo.4331126).

can function as leverage points for sustainability transformations (see Section 5.3.3) (Abson *et al.*, 2016; Fischer *et al.*, 2012). Acknowledging diverse values is possible via inclusive and informed governance, which builds on a robust evidence-base, empowers marginalized groups of stakeholders holding sustainability values, stimulates dialogue, learning and reflection, and co-produces knowledge on different value types (IPBES, 2019a; Visseren-Hamakers *et al.*, 2021).

- **They foster institutional change.** Enhancing the learning and experimenting conditions within existing social and institutional networks can help overcome the institutional and legislative lock-ins that prevent sustainability transitions (Schreurs *et al.*, 2019; Stevens & Kanie, 2016). This way, institutional restructuring can go beyond the modification of policy, administration, legislation and institutions, and induce changes in behaviour, values, and culture as well (Kelly *et al.*, 2019; Schreurs *et al.*, 2019).

- **They improve the capacities of different actors.** The capacities of government actors to devise, implement and adapt new institutional arrangements (Förster *et al.*, 2020), as well as of other actors (e.g., businesses, civil organizations or individuals) to support the intended changes (Colloff *et al.*, 2017) is equally important. Transformation towards sustainability requires transformative literacy, which is the capacity of all actors to assess information about transformation processes, and utilise the information to get involved in the right stage of transformation processes (Göpel, 2016) (see Section 6.1.2.4).

- **They support integrative-adaptive governance.** Sustainability transformation goals are complex, uncertain, and constantly moving, so governance needs to enable continuous learning, experimentation, reflexivity, monitoring, and feedback (Borie *et al.*, 2020; IPBES, 2019a). Coordination, integration and combination of policy instruments – i.e., a policy-mix approach (Koh, 2020)– can ensure that local solutions also have sustainable impacts at other scales and locations, on other issues, and in other sectors (Visseren-Hamakers *et al*., 2021).

These five main features will be used in the following Section 6.2 as the key criteria to assess how far available policy options can support sustainability transformations.

6.1.2.2 Stakeholders

An effective consideration of diverse values into decision-making and policies requires supporting and creating enabling contexts for participation, deliberation and negotiation between and within different actors, pondering differing interests and values. A starting point for this is to map the relevant stakeholders. Those actors (incl. public, private and civil society actors) are considered *stakeholders* in Chapter 6 who are involved in decision-making processes and implementation, either as influencing the decision-making process, or as being dependent on, and therefore facing the consequences of, the decisions. Asymmetries in power, information, and capacities among these stakeholders should be considered to understand who wins, who loses, and who has the power and responsibility to make changes in these relationships (Reed *et al.*, 2009). Considering these aspects, several stakeholder groups have been identified, who may be categorized into three different (but not exclusive) categories according to their level of influence and affectedness (Chevalier & Buckles, 2008):

- ***Influencers:*** people and organizations who influence decision-making processes related to biodiversity and therefore have an impact on those who implement the decisions;

- ***Affected actors:*** people and organizations who are directly involved in (and dependent on) the implementation of biodiversity related decisions, and have their own stakes and interests (not directly targeted by this chapter);

- ***Key players:*** people and organizations who both can influence and become affected by decisions – that is, in certain contexts, they serve as influencers, while at the same time are involved in actual decision-making (Grimble & Wellard, 1997; Miles, 2017).

The assessment of policy options in this chapter is focused towards “influencers” and “key players” who can be considered as the main actors shaping policy decisions on nature. Many of the influencers and key players can also act as bridging organizations, i.e., they can enable the negotiation across multiple priorities and preferences of stakeholders regarding decisions on biodiversity (Berkes, 2009; Hahn *et al.*, 2006). The stakeholder groups identified as the most relevant ones are shown in **Figure 6.3** and explained in more detail in Annex 6.1. Please note that the major groups presented are not homogeneous but include diverse individuals and organizations, who – depending on the context and the exact decision to be made – might act in different roles. For instance, in a local resource use conflict self-sufficient farmers might be affected actors and large farms might be influencers, while in negotiations on agri-environmental subsidies both small and large-scale farmers might be considered as key players.

The seven stakeholder groups written in black in the above **Figure 6.3** will be considered in the following sections as the main target groups, i.e., the key stakeholders to whom

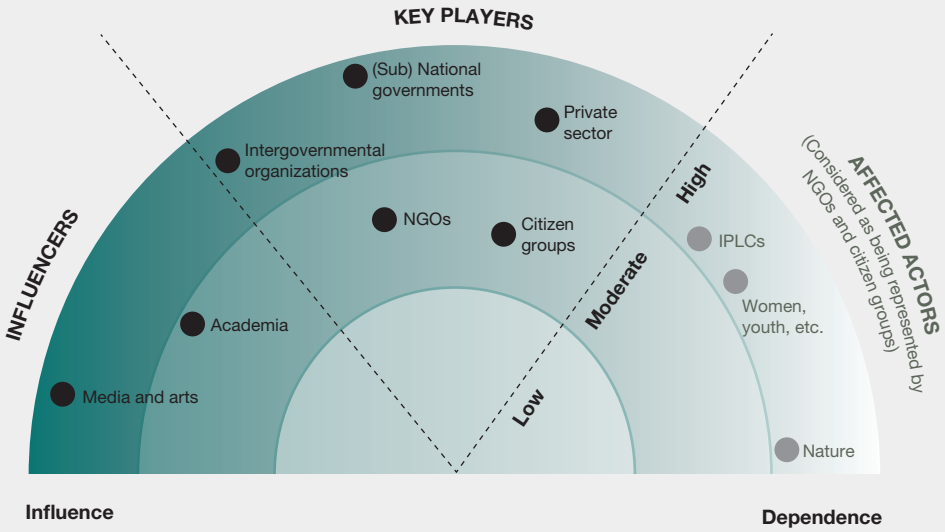


Figure 6 3 **The stakeholder typology used in the chapter (based on Chevalier & Buckles, 2008).**

Chapter 6 aims to provide options and opportunities on how they could operationalize the multiple values of nature in their decisions (Annex 6.1).

6.1.2.3 Decision-making context and scale

Socio-cultural, political, and economic contexts vary hugely across the world, and determine which types of decisions are made by whom and how (Preiser *et al.*, 2018; van Kerkhoff & Pilbeam, 2017). In some contexts, particular worldviews and their values are more dominant than others and some of them could be invisible, unrecognized and/or forbidden. Political decisions establish and enforce the formal rules of access and use of natural resources and the sharing or redistribution of benefits associated, and together with other environmental, cultural and social factors, they determine the general context of decisions regarding nature (Ostrom, 2009; Vatn, 2005). Contexts can be hindering or permitting the recognition and consideration of diverse values (as well as value holders or actors). Whether the context enables a good coexistence and acceptance of different worldviews and values, permits or restricts knowledge weaving and/or co-production in decision-making and policies, will depend on specific political, socio-cultural and institutional conditions, as well as on different types of capacities at place (Pascual *et al.*, 2021).

Countries could encounter different challenges in including diverse values in decision-making depending on the socio-political realities in a society and hence, need tailored solutions (see Section 6.5). For example, in a context where there is a strong one-way communication from a dominant worldview as well as restricted access to information that differs from it, where customary rights are neither recognized nor allowed, the ways and tools to support knowledge sharing and exchange could consider the establishment of safe spaces to avoid negative impacts such as repression and exclusion. Legal and regulatory instruments might be counterproductive in places where legal structures and enforcement are weak and characterized by distrust, especially if capacity development does not target governance and negotiation capacities. Economic and financial instruments might be similarly counterproductive in places where informal markets and reciprocal relationships are strong, financial mechanisms are not transparent, and funds are insufficient, especially if capacity development does not focus on analytical, bridging and motivational capacities. Addressing capacity gaps at the level of governance, institutions, and individual actors is a potential way to create more enabling contexts for diverse policy instruments (see Section 6.4.4 and 6.5).

One specific aspect of the context of decision-making is the scale at which the given decision is taken (Brondizio *et al.*, 2009). Enhancing resilience and achieving sustainability requires the implementation of relevant policy options at appropriate scales to govern the demand and use of nature and nature´s contributions to people (Cumming *et al.*, 2013). However, interactions across different spatial, temporal, governance, and knowledge scales (that are not necessarily linear), raise several challenges to scaling out and scaling up existing policy options (Apostolopoulou & Adams, 2019; Cash *et al.*, 2006; Wiegant *et al.*, 2020). These include situations where:

- cross-scale interactions are not considered (policies and management decisions focus on just one single scale);

- cross-scale interactions are considered, but there is a spatial or temporal mismatch between policies and ecological and social processes targeted (or unintentionally impacted) by the given policies (Cumming *et al.*, 2006; Ramiller & Schmidt, 2018; Roberts *et al.*, 2018).

- cross-scale interactions are realized, but the heterogeneity of how different scales are perceived by stakeholders is not considered (Ahlborg & Nightingale, 2012). Influencers may frame a decision-making situation as being relevant at a specific scale, and therefore allocate power and authority to specific stakeholders (Lieshout *et al.*, 2011).

Local level policy implementations show huge variability in their socio-cultural, geographical and political contexts, and consequently in the successful implementation of any policy option. Thus, mismatches in national and global policies and local implementation are a reality in many different contexts. Due to the complex nature of socio-ecological systems (Preiser *et al.*, 2018), the contexts in which these mismatches occur, and implementation fail, can be hard to predict and generalize. As this is an IPBES assessment, the focus of this chapter is at global, sub-global (regional), and national scales, but by recognizing the importance of local context and scale mismatch, the potential of policy instruments at local scales is considered, particularly through the lens of on-the-ground-initiatives and valuation uptake cases (see Section 6.2) and policy implementation within specific sectors (see Section 6.3).

6.1.2.4 Capacities

How far transformations in biodiversity governance can reach is determined by the intersection of capacities available for different stakeholders in different decision-making contexts and scales (Förster *et al.*, 2020). Capacity development is therefore considered as one of the main interventions ("levers") that can tackle the underlying indirect drivers of nature deterioration (IPBES, 2019a). The capacity development concept applied in this chapter goes beyond the traditional view of one-way, top-down knowledge transfer towards social learning and knowledge co-creation. In these approaches, knowledge is considered not as *something* that can be given or received, but rather as the shared outcome of an interactive and context-specific social process that evolves over time (Barth, 2002; Brown, 2004; Lang *et al.*, 2012; Lotz-Sisitka *et al.*, 2015; Roux *et al.*, 2017; Wiek *et al.*, 2011). Rather than transmitting information, capacity development focuses on reflection and change (Freire, 2000), and therefore contributes to transforming information into knowledge (Reyers *et al.*, 2018; Selomane *et al.*, 2019; Tengö *et al.*, 2014). Capacity development in this broad sense is more accommodating to indigenous views and processes. In many indigenous cultures "capacity" is not seen as something fixed. Rather, someone can develop their role or responsibility by moving through a scale of knowledge and skill, which process is often linked to practicing mindfulness (ISE, 2019) and connectedness (Smith, 2012).

To apply an inclusive approach to capacity development six broad capacity dimensions have been defined in this chapter **(Figure 6.4)** based on existing frameworks for adaptive capacity to climate change (Gupta *et al.*, 2010) and managing risk and vulnerability to natural hazards (Kuhlicke *et al.*, 2011; Kuhlicke & Steinführer, 2015).

Motivational capacities ensure that stakeholders (both individuals and organizations) have awareness of, and desire to, consider diverse values in decisions. Motivational capacities are strongly embedded into the cultural, economic, institutional and policy context (Balmford, 2002; Cormier & Gordon, 2001; Kent & Myers, 2001; Young, 2002). Motivation can have intrinsic sources (e.g., sense of meaning, internalized norms and social conventions, which are often rooted in socio-cultural relations and worldviews), and extrinsic sources (e.g., rewards or punishments, which can be established by formal rules and policy instruments) (Ryan & Deci, 2000), although organization studies found that intrinsic motivation is more strongly linked to positive attitudes and work performance (Gagné & Deci, 2005; Lawler & Hall, 1970; Schreurs *et al.*, 2014).

Analytical capacities help select and use suitable tools to acquire and synthesise all necessary information on diverse values. Scientific methods – and valuation tools – carry a cognitive representation of the world, a theorization of action, and give legitimacy to specific values and perspectives (Cabane & Tantchou, 2016; Carolan, 2009; Desrosières, 1998; Lascoumes & Le Galès, 2005). The relation between knowledge and decision-making is not straightforward or self-evident (Dessai *et al.*, 2009; Dilling & Lemos, 2011; Matzek *et al.*, 2014; Pullinger, 2014; Sutherland *et al.*, 2014; Wesselink *et al.*, 2013). To recognize and consider the nature's diverse values in decisions, valuation needs to be inclusive towards different forms of scientific and non-scientific knowledge (Cash *et al.*, 2003; Mauser *et al.*, 2013; Robertson & Hull, 2001).

Bridging capacities provide a pluralistic, value-based perspective to problem-oriented decision-making that bring together different ways of knowing and doing in a co-learning process. Facilitation is a crucial element of co-producing legitimate and credible knowledge for decision-making (Breslow, 2015; Kok *et al.*, 2017; Lemos & Morehouse, 2005; Peterson *et al.*, 2003; Turnhout, 2018; Voinov & Bousquet, 2010).

Negotiation capacities, targeted both at the individual and the organization level, can broaden the process of

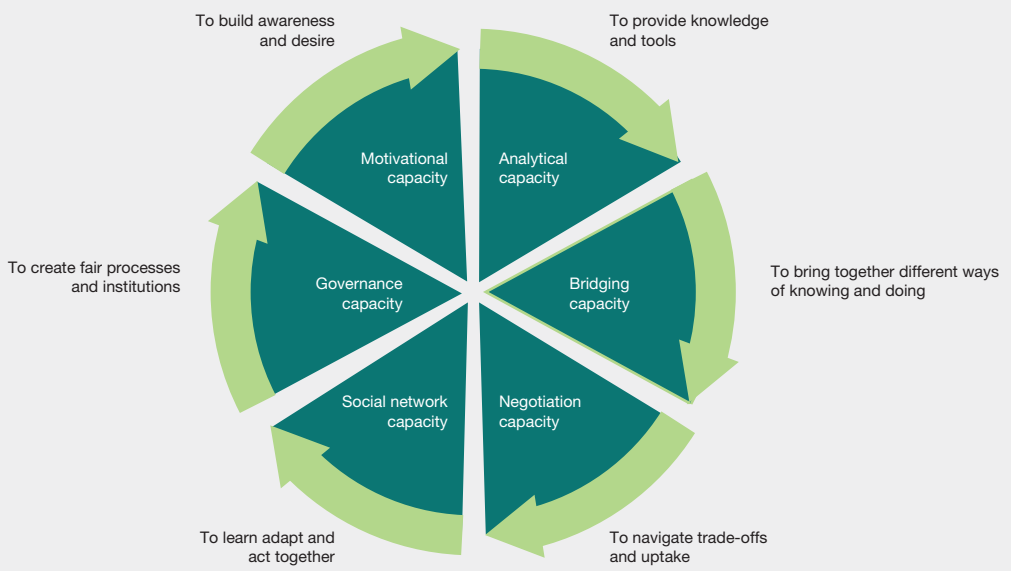


Figure 6 4 **The capacity wheel.**

negotiation from enforcement to relationship building and cooperation (Fairman *et al.*, 2012; Soliman & Antheaume, 2017), and therefore help navigating trade-offs between the values and interests of different stakeholders (de Magalhães *et al.*, 2019). Negotiation capacities are also crucial in situations where trade-offs lead to conflicts among contrasting groups of winners and losers (Butler *et al.*, 2013; Kovács *et al.*, 2015; McShane *et al.*, 2011; Turkelboom *et al.*, 2018).

Social networking capacities support learning (Armitage *et al.*, 2011; Bartlett *et al.*, 2012; Reed *et al.*, 2014), adapting (Simha *et al.*, 2017) and acting together (Berkes, 2009; Reed *et al.*, 2017). A governance system that builds on strong networks can effectively use social mechanisms (e.g., collective sanctions, social memory) to adapt, coordinate, and safeguard exchanges (Jones *et al.*, 1997) and therefore can increase regional resilience (Luthe *et al.*, 2012).

Governance capacities allow effectively resolving problems and fulfilling the needs of citizens by mobilizing resources, making decisions via analytic and deliberative functions, and implementing decisions via coordination and regulation (Christensen *et al.*, 2016; Dang *et al.*, 2016; Tan, 2019). Improving governance capacities contributes to good governance (Rothstein & Teorell, 2012), and ensures that fair policies and institutions exist, and decisions incorporate the values held by different stakeholders in an accountable, transparent, and reflexive way (González & Healey, 2005; van der Molen, 2018) (Annex 6.1).

These six capacity dimensions are used in Section 6.4 to highlight how capacity development can help bridge the knowledge and operationalization gaps which limit the operationalization of multiple values of nature in decisions.

6.1.3 The main findings of the chapter

The assessment shows clear evidence that incorporating a more plural approach to valuation enables just and sustainable decision-making on nature and nature´s contributions to people. It also allows better implementation of sustainable development policies, ensures higher coherence between different sectoral priorities and initiatives and more equitable involvement of different stakeholders. However, the use and effectiveness of various policy tools, instruments and methods is dependent on contexts (of scale, socio-political and environmental) and availability of various types of resources and capacities to different sets of stakeholders. It therefore is pertinent to ensure that a decision/policymaking cycle be cognizant of principles of inclusivity, equity and sustainability. This chapter is organized across assessments of the design and impact of existing policy tools/instruments and initiatives (see Section 6.2), of sectoral and cross sectoral initiatives (see Section 6.3), gaps and challenges that limit plural approaches in decision-making (see Section 6.4) and finally identification of guidelines and approaches to operationalize the incorporation of diverse values in the policy cycle (see Section 6.5).

6.2 EXISTING AND EMERGING POLICY OPTIONS THAT LEVERAGE DIVERSE VALUES APPROACHES FOR TRANSFORMATIVE GOVERNANCE

6.2.1 How diverse value approaches inform policies in different decision-making contexts

Section 6.2 takes an expansive view on policy options for operationalizing diverse values for transformative change and assesses several policy instruments and global initiatives for biodiversity conservation (see further details in Annex 6.2). It builds on three different sources of evidence: (i) policy instruments listed in the IPBES catalogue of policy instruments and analysed in the IPBES Global Assessment Chapter 6, (ii) scientific literature addressing brightspots in valuation uptake (building on the assessment of Chapter 4 of the values assessment)[5], and (iii) global and international initiatives governing biodiversity management at various scales. The section is divided into two main subsections.

Section 6.2.2 compiles a list of policy instruments from the IPBES catalogue of policy support tools and the IPBES Global Assessment and assesses their potential to contribute to system-wide changes through the different aspects of transformative governance (IPBES, 2017, 2019a). Additional examples drawn from Chapter 4 and its' "brightspot identification"[6] have been reviewed to identify real life examples where policy instruments and support tools were successfully implemented in different contexts and scales to affect transformative governance.

Section 6.2.3 analyses global and large-scale conservation initiatives that are responsible for governing biodiversity management at various scales. For each of these, one case study that highlights transformative governance is identified, and then the context, scales, stakeholders, and values of relevance in these cases are assessed[7].

The whole section builds on the key findings of the preceding chapters of the IPBES *values assessment*. Its starting point is the recognition that values influence public decision-making both through the institutions guiding such decisions as well as through public and stakeholder participation. The way that such participation is facilitated and conducted influences how the diverse values of biodiversity and nature will be acknowledged and addressed in environmental governance (see Chapter 2).

Different policy options represent different sets of values. Instrumental values of nature have often been accounted for through payments for ecosystem services (PES) and other economic instruments. Economic instruments drawing mainly on value monism have supported a wide range of biodiversity conservation outcomes (see Chapter 2, 2.3). Whilst there are multiple examples of management and conservation strategies for conserving the intrinsic values of nature, there are far fewer examples of relational values, which have also received less attention in scholarship (see Chapter 2.2.1, 2.2.3).

As Chapter 4 highlights, the available policy options (i.e., the formal rules and informal norms) that guide the use of nature, reflect and reinforce the knowledge-power nexus of society, reveal much lower effective valuation of nature compared to the values currently expressed in the Sustainable Development Goals or by indigenous peoples and local communities. In particular, the formal rules and regulations governing the global supply chains, and the natural resource extraction these regulations enable, reveal very different values of nature compared to the values expressed by indigenous peoples and local communities, generating conflicts around extractive projects (Amnesty International, 2019; Human Rights Watch, 2020; IUCN, 2019). Economic incentive-based policy approaches can intentionally and unintentionally affect people's environmental and pro-social values in that they can reduce intrinsic motivation for nature conservation, either directly or by increased emphasis on instrumental values (see 4.3.3).

Considering the above summarized findings of the preceding chapters, it is of high importance to understand how current policy approaches can be made more inclusive towards diverse values, and to identify innovative and holistic governance solutions which can foster transformative change (IPBES, 2019a; Pelling *et al.*, 2015). Thus, whilst Section 6.2 draws a broader focus on diverse value approaches informing policies in different decision-making contexts, stakeholders etc., (see 6.1), the ultimate interest is to understand how, when, for whom policies can support transformative governance as the way to facilitate transformative changes.

6.2.2 What policy options exist for affecting transformative governance

In Section 6.2.2 a meta-analysis of 37 policy instruments was carried out using the five key components of transformative governance as the main assessment criteria, i.e., whether the policy instruments address the *status quo*,

5. Brightspot Cases text analysis (https://doi.org/10.5281/zenodo.4338411).
6 Brightspot Cases text analysis (https://doi.org/10.5281/zenodo.4338411).
7. Transformative Governance within Policy Instruments and Initiatives (https://doi.org/10.5281/zenodo.4331126).

incorporates diverse values, foster institutional change, promote capacities, and are implemented in an integrative and adaptive manner (see 6.1.3). Policy instruments were defined and categorized according to the IPBES Catalogue of policy support tools and policy instruments **(Box 6.1)** (IPBES, 2017). The initial list of policy instruments was derived from the same source (IPBES, 2017). Additional policy instruments were added to this list after screening the IPBES Global Assessment (IPBES, 2019a). The main source of evidence used was the core text and the annexes of Chapter 6 of the IPBES Global Assessment, and where evidence was scarce, additional targeted literature reviews were carried out (Annex 6.2). Results of this assessment are shared in the following four subsections, organized along the four categories of policy instruments (economic and financial, legal and regulatory, social and cultural, and finally rights-based and customary instruments).

Assessing how far policy instruments can support transformative or incremental change was challenging for several reasons. First, for many instruments there is a lack of detailed empirical evidence on place-based implementation. Second, in practice several policy instruments are implemented at the same time as part of a policy mix, hence the impacts of a single instrument are hard to identify as those usually emerge as a result of interplay between all the used instruments. Third, even where robust evidence is available for a single instrument, it often shows a high variability across the different contexts. This highlights that the extent to which a policy instrument supports transformative or incremental change depends largely on how exactly it is implemented and how much it aims to challenge the institutional settings that maintain the *status quo*. These challenges of evaluation lead us to choose the potential for change (either transformative or incremental) as the focus of our analysis.

In addition to the meta-analysis of the 37 policy instruments, Section 6.2.2 also analysed the valuation "brightspots" assessed in Chapter 4. "Brightspots" were identified by Chapter 4 through a comprehensive literature review of papers in the academic and grey literature where assessors could find evidence for valuation uptake in policy and practice. We selected "brightspots" that showed evidence of engaging diverse value approaches in policy, and further analysed them along dimensions of transformative potential (Annex 6.1). This assessment did not find sufficient evidence for transformative governance in these cases. Rather, in demonstrating evidence for valuation uptake, the "brightspot" cases represented potential dimensions of transformative governance and illustrated some key themes for facilitating the transformative potential of policy instruments **(Figure 6.6)**. Findings of the "brightspots" assessment are weaved into the policy instrument analysis to highlight how transformative governance has been facilitated in on-the-ground implementation of different policy instruments[8].

6.2.2.1 Economic and financial policy instruments

Economic and financial instruments include regulations that financially incentivise or constraint specific activities by handling out or taking away economic resources (IPBES, 2017). Altogether 13 economic and financial instruments were assessed identifying their potential to incorporate diverse values and lead to change **(Table 6.2)**. The subsection first sums up the assessment results for each of the 13 economic instruments, then key lessons regarding their on-the-ground implementation are shared based on the analysis of relevant "brightspot" cases.

Description of economic policy instruments

Alternative economic models, e.g., the *Buen vivir* in Bolivia and Ecuador, the *Ecological Civilization* in China, or degrowth models realize that to avoid the future deterioration of the environment and human well-being, the current growth oriented economic paradigm needs to be replaced (IPBES, 2019a). Alternative economic models apply a diverse value approach, treating material, social and spiritual/mental well-being as equally important (Yan & Spangenberg, 2018), and put a strong emphasis on learning and developing capacities (Echavarría & Orosz, 2021; Wang *et al.*, 2020). However, the evidence base is weak especially regarding place-based implementation, mainly because such initiatives only sporadically exist around the world.

Alternative measures of human well-being are also offered to overcome the challenges associated with the monistic and growth-oriented approach of the gross domestic product. Examples include the Gross National Happiness Index of Bhutan which combines equitable social development, cultural preservation and conservation of the environment (Verma, 2017), or the Genuine Progress Indicator which broadens gross domestic product calculations with the utility derived from non-market goods and services (e.g., unpaid work or nature's contribution to people), and the disutility emerging from negative externalities (e.g., costs of environmental degradation) (Berik, 2020; Talberth & Weisdorf, 2017). While such measures are increasingly used at national and subnational level, further work is needed to better incorporate nature and

8. It is important to note that "brightspot" examples were unevenly covering the four types of policy instruments. They were strongly focused (82 % of assessed studies) on legal and regulatory instruments, and to a much lesser extent (38.8%) on economic and financial instruments. Rights-based and customary instruments (8.2%) and socio-cultural instruments (18%) featured scarcely in the assessed literature. In terms of transformative dimensions, cases most often concerned the "integrative-adaptive" (85.2% of assessed cases) and "addressing diverse values" (82% of assessed cases) elements of transformation, while "addressing the *status quo*" (5.3%) and "capacity-building" (37.8%) were less frequently addressed.

Table 6 2 **Comparing existing economic and financial policy instruments in terms of their transformative potential.**

Potential for change	Name of policy instrument	Assessment criteria: Address *status quo*	Assessment criteria: Incorporate diverse values	Assessment criteria: Foster institutional change	Assessment criteria: Promote capacities	Assessment criteria: Integrative & adaptive	Potential scale of implementation	Key influencers of implementation
More transformative	Alternative economic models	●	●	●	○	●	Global	Intergovernmental organization; (Sub-)national governments
More transformative	Alternative measures of human well-being	●	●	○	○	●	Global, National	Intergovernmental organization; (Sub-)national governments
More incremental	Payment for ecosystem services	●	○	○	●	○	Global, National, Subnational	Intergovernmental organization; (Sub-)national governments; NGOs and donors; Private sector
More incremental	Environmental subsidies (& eliminating harmful subsidies)	●	○	●	○	○	Global, National, Subnational	Intergovernmental organization; (Sub-)national governments
More incremental	Ecological fiscal transfers	●	○	●	◌	○	Global	(Sub-)national governments
More incremental	Ecosystem accounting	●	○	○	○	○	Global	Intergovernmental organization; (Sub-)national governments; Private sector
More incremental	Biodiversity financing (including ODA)	●	○	○	○	○	Global, National	Intergovernmental organization; NGOs and donors
Maintaining *status quo*	REDD+	●	○	◌	◌	○	Global, National	Intergovernmental organization; (Sub-)national governments; NGOs and donors
Maintaining *status quo*	Taxes on consumption	●	○	◌	◌	○	Global	(Sub-)national governments
Maintaining *status quo*	Tradable permits	○	◌	○	◌	◌	Global, National	Intergovernmental organization; (Sub-)national governments; Private sector
Maintaining *status quo*	Biodiversity relevant taxes, charges and fees	○	◌	○	◌	◌	Global	(Sub-)national governments
Maintaining *status quo*	Biodiversity offsets	○	◌	◌	◌	◌	Global, National	(Sub-)national governments; Private sector
Maintaining *status quo*	Derivatives trading and commodity futures	○	◌	◌	◌	◌	Global, National	Intergovernmental organization; (Sub-)national governments; NGOs and donors; Private sector

Potential contribution to transformative governance

High ● ○ ◌ Low

Scale of implementation

Global
National
Subnational
Local

Key influencers

Intergovernmental organization
(Sub-)national governments
NGOs and donors
Private sector

its contributions to people, and to ensure their application across multiple scales (Talberth & Weisdorf, 2017).

Payments for ecosystem services are market-based instruments to financially incentivize conservation action which are widely used and implemented in many different ways (Börner *et al.*, 2017; McElwee, 2012; Salzman *et al.*, 2018; Shapiro-Garza, 2013). While it can incorporate diverse values and can be accompanied by strong capacity development, high transaction costs as well as uneven power relations and unequal distribution of benefits can undermine its transformative potential (Berbés-Blázquez *et al.*, 2016; Cáceres *et al.*, 2016; Porras *et al.*, 2013; Salzman *et al.*, 2018; van Hecken *et al.*, 2019).

Ecological fiscal transfers redistribute tax revenues from national to state or local governments by using ecological indicators to acknowledge ecological public functions and to fund local (subnational) conservation actions (Droste *et al.*, 2017; Ring *et al.*, 2011). Ecological financial transfers enable the decentralization of conservation efforts (IPBES, 2019a) therefore it can foster institutional change and contribute to a more inclusive and adaptive conservation practice. Ecological financial transfers are increasingly applied around the world (e.g., in Brazil, India or Portugal) (Busch *et al.*, 2021), partly because their implementation might induce lower transaction costs compared to payments for ecosystem services as the existing fiscal system can be used for the transfers (i.e., no new allocation system is generated in most cases) (Ring, 2008; Ring & Barton, 2015; Schröter-Schlaack *et al.*, 2014).

Environmental subsidies that apply positive incentives for conservation measures are widely used across the continents (e.g., agri-environmental schemes or financial support for local fisheries management). While good examples exist for subsidies incorporating diverse values of nature, fostering institutional change, offering capacity development and enabling local adaptation, these address only the direct drivers of biodiversity loss instead of the underlying causes (such as unsustainable production and consumption patterns). Despite governments having made commitments to eliminate those incentives which are harmful for biodiversity by 2020 (Aichi Target No. 3) and to develop and apply positive incentives for biodiversity conservation and sustainable use, ecologically inefficient and harmful subsidies still persist among others in the agricultural, fishery, and energy sector, and are estimated to outweigh pro-biodiversity subsidies by a factor of 10 (IPBES, 2019a; OECD, 2017). To address the root causes of the current crisis and therefore enhance the transformative potential of environmental subsidies, the removal of perverse subsidies is critical (McElwee *et al.*, 2020).

Ecosystem accounting (or natural capital accounting) includes a wide variety of methods and approaches which are used to incorporate the values of nature into public and business accounts, ranging from monetizing methods to more diverse approaches including also non-monetary units (Agarwala *et al.*, 2014; Faccioli *et al.*, 2016; Giampietro, 2014; Hooper *et al.*, 2019; Lomas & Giampietro, 2017; Ten Brink, 2012). It is used in different ways and for different purposes; in some cases as a national indicator of non-monetary wealth (the green gross domestic product), in other cases as a national or subnational planning tool (Brown & Ulgiati, 1999, 2011; Franzese *et al.*, 2014, 2019; Geng *et al.*, 2013; Sumarga *et al.*, 2015; Ulgiati *et al.*, 2011). It provides new and nuanced information to decision-makers about stocks and flows of natural capital, which is important because in economic market mechanisms, these "externalities" are not visible in the price of commodities. The significance of the instrument is based on the premise that more information will result in better decision-making – still, it fits into the current economic paradigm and fosters transformation only if technical, negotiation and governance capacities are promoted (Annex 6.2).

Biodiversity financing in developing countries is mainly covered by international aid (IPBES, 2019a). Finance mobilized for conservation is below the level that is estimated to be globally sufficient, and evidence is scarce and inconclusive about both conservation outcomes and socio-economic impacts (Bare *et al.*, 2015; Börner *et al.*, 2017; Miller *et al.*, 2013; Waldron *et al.*, 2017). However, new trust fund and collective fund approaches (e.g., the Amazon Fund in Brazil) can have higher transformative potential if accompanied by capacity development and management follows an inclusive and adaptive approach.

Reducing Emissions from Deforestation and Forest Degradation (REDD+) compensates developing countries for reducing greenhouse gases emissions and at the same time aims to contribute to poverty alleviation and biodiversity conservation. While it is increasingly used in Latin America (Corbera & Brown, 2010; Osborne, 2011; Rival, 2013) and Africa (Namirembe *et al.*, 2014), some key challenges – such as how to guarantee positive ecological and social outcomes – have yet remained unresolved (Atela *et al.*, 2015; Lawlor *et al.*, 2013; Murray *et al.*, 2015; Reynolds, 2012). REDD+ has also been observed to contribute to a recentralisation of forest governance by bringing forests under renewed forms of government control (Abidin, 2015; Duchelle *et al.*, 2014; Sunderlin *et al.*, 2014; Vijge & Gupta, 2014).

Taxes on consumption can address both overconsumption and pollution, although very few examples exist where a consumption tax directly targets ecosystems or biodiversity (e.g., eco-VAT in Brazil, Farley & Costanza, 2010), and the literature is inconclusive in terms of their current environmental and social impacts (IPBES, 2019a).

Tradable permits, biodiversity offsets and biodiversity relevant taxes and fees aim at internalizing the negative environmental impacts of development and provide alternative financial sources to nature conservation by reallocating resources from the private sector (IPBES, 2019a). **Derivatives trading and commodity futures** (contracts that stipulate the price, volume, and date of transactions) can reduce risk but are also often the target of speculation and therefore can contribute to high price volatility and turbulence (Cooper, 2010). These instruments follow a more focused, market-oriented logic, and do not offer stimulus for institutional change or adaptive governance. Recent articles acknowledge that short term actions capitalizing mainly on policy instruments belonging to this third group (e.g., eliminating harmful subsidies, increased standards for green private investments or including bonus-malus schemes in environmental taxation) help mitigate the impact on biodiversity (see e.g., McElwee *et al.*, 2020), but are insufficient to shift the current economic paradigm to one which is more aware of other values of nature.

Lessons learnt from on-the-ground implementation

The analysis of the "brightspot" cases highlighted that multiple and diverse criteria can be critical for facilitating transformative governance, especially for economic instruments. Policy support tools can help stakeholders to learn about a system through diverse value and knowledge perspectives, e.g., through assessing, discussing and prioritizing multiple and diverse criteria (Graziano *et al.*, 2009; Hajkowicz *et al.*, 2008; Karjalainen *et al.*, 2013; Rohde *et al.*, 2006). Multi-criteria decision-making and assessment engage multiple stakeholders in defining and assessing the measures and values by which to evaluate and monitor landscape change, and implement policy (Hajkowicz *et al.*, 2008; Karjalainen *et al.*, 2013). Multi-criteria approaches allow flexibly defining the assessment criteria, not requiring all of them to abide by similar underlying frameworks or scales, but to exist and be weighted as measures in their own rights (Ha *et al.*, 2017). The participatory analytic hierarchy process is effective in supporting diverse value approaches in transforming governance, in part thanks to its ability to integrate variables with different underlying assumptions (Ananda, 2007; Rahman *et al.*, 2015). Support tools such as social benefit-cost accounting (e.g., Xu *et al.*, 2003), the preferred strategic alternative method (Barquet & Cumiskey, 2018), socio-cultural valuation (Iniesta-Arandia *et al.*, 2015) and the stated preferences method (García-Llorente *et al.*, 2011) give equal weight to different stakeholders' interest by allowing benefits that are different in nature and scale to carry significant value in shaping decisions (Xu *et al.*, 2003). They allow diverse criteria, informed by different worldviews, values and knowledge systems, to inform policy development and implementation support interaction, dialogue and negotiation among stakeholders (Barquet & Cumiskey, 2018; García-Llorente *et al.*, 2011; Iniesta-Arandia *et al.*, 2015), improve political debates (Xu *et al.*, 2003), put political issues into a common context (Xu *et al.*, 2003), help to surface, articulate and monitor trade-offs to diverse stakeholders (Ananda, 2007; García-Llorente *et al.*, 2011; Rahman *et al.*, 2015), and enhance the transparency of participatory processes and the public acceptance of policy decisions (Ananda, 2007; Rahman *et al.*, 2015).

However, including diverse criteria in policy development and implementation is not a silver bullet. Certain values (such as economic values) may be more powerful or dominant in presenting the outcomes of valuation (Hajkowicz *et al.*, 2008), and monitoring and evaluation using multiple criteria may be more expensive and complicated, which can undermine its uptake, sustainability, and effectiveness (Lovrić *et al.*, 2018).

6.2.2.2 Legal and regulatory policy instruments

Legal and regulatory policy instruments include formal rules and regulations that legally regulate (prohibit, sanction or inhibit) certain activities (IPBES, 2017). Altogether, 13 legal and regulatory policy instruments were assessed to identify their potential for incorporating diverse values and their transformative potential **(Table 6.3)**. The subsection first sums up the assessment results for the legal instruments, then key lessons regarding their on-the-ground implementation are shared based on the assessment of "brightspot" cases.

Description of legal policy instruments

One legal/regulatory instrument was found to have considerable transformative potential, the *rights of nature* approach, which is increasingly applied around the world (including e.g., countries like Ecuador, Bolivia, India or New Zealand) and has been assessed as having a considerable potential to enable transformative change. The recognition of nature's (or its specific entities') rights puts intrinsic and relational values in focus and often builds on indigenous peoples' worldviews (Akchurin, 2015; Borràs, 2016; Díaz *et al.*, 2015; Gordon, 2017; Rühs & Jones, 2016). Implementing rights of nature via national constitutions[9] (Annex 6.2) or laws creates room for institutional change by supporting co-management regimes and accepting the legitimacy of customary institutions (Strack, 2017; Takahashi *et al.*, 2021). However, even if rights of nature are protected by law, it is challenging to avoid the oversimplification of IPLCs' value systems (Bidder *et al.*, 2016; Griewald *et al.*, 2017; Johnson *et al.*, 2016) and to give voice to ecosystems in courtrooms (McNeill, 2016; Temper & Martínez-Alier, 2016).

9. Constitutions pluralistic value approach text analysis (https://doi.org/10.5281/zenodo.4329704).

Table 6 3 **Comparing existing legal and regulatory policy instruments in terms of their transformative potential.**

Potential for change	Name of policy instrument	Assessment criteria: Address *status quo*	Incorporate diverse values	Foster institutional change	Promote capacities	Integrative & adaptive	Potential scale of implementation	Key influencers of implementation
More transformative	Rights of nature	High	High	High	High	Low	Local	Intergovernmental organization
More incremental	Legally protected areas	Low	Low	Low	Low	Low	National	Intergovernmental organization; (Sub-)national governments; NGOs and donors
More incremental	Locally managed marine areas	Low	Low	Low	Low	Low	Subnational	(Sub-)national governments; Private sector; Civil society groups and communities
More incremental	Marine protected areas and spatial planning	High	Low	Low	Low	Low	National	Intergovernmental organization; (Sub-)national governments
More incremental	Multilateral agreements	Low	Low	Low	Low	Low	Global	Intergovernmental organization; (Sub-)national governments
More incremental	Expanding food market transparency	High	Low	Low	Low	Low	Local	(Sub-)national governments
More incremental	Environmental public interest litigation	Low	High	Low	Low	Low	Local	(Sub-)national governments; NGOs and donors
Maintaining *status quo*	Environmental impact assessment	Low	Low	Low	Low	Low	Local	Intergovernmental organization; (Sub-)national governments
Maintaining *status quo*	NBSAPs and other national legislation	Low	Low	Low	Low	Low	Local	Intergovernmental organization; (Sub-)national governments
Maintaining *status quo*	Legislative control over pesticide use	Low	Low	Low	Low	Low	Local	(Sub-)national governments; Private sector
Maintaining *status quo*	Commodity chain regulation	High	Low	Low	Low	Low	Global	(Sub-)national governments; Private sector
Maintaining *status quo*	Trade bans	Low	Low	Low	Low	Low	Global	Intergovernmental organization; (Sub-)national governments; Private sector
Maintaining *status quo*	Legal restrictions on natural resource use	Low	Low	Low	Low	Low	Local	(Sub-)national governments

Potential contribution to transformative governance

High — Low

Scale of implementation

Global
National
Subnational
Local

Key influencers

Intergovernmental organization
(Sub-)national governments
NGOs and donors
Private sector
Civil society groups and communities

Legally protected areas have a traditionally narrow focus on the intrinsic values of nature, but with the increasing acceptance of co-management regimes and IPLC-led conservation initiatives (see also socio-cultural and customary instruments below) there is a tendency to apply more diverse value approach and to promote local capacities and customary institutions, which contributes to better environmental outcomes, more equal benefit-sharing, and increased local well-being (Molnár *et al.*, 2016; Moreaux *et al.*, 2018; Neudert *et al.*, 2017; Oldekop *et al.*, 2016). This can also lead to a wider institutional change, although the potential for integration and adaptation depends also on the power and interest of other sectors.

Locally managed marine areas show very similar characteristics – their transformative potential seems to depend on the inclusion of indigenous peoples and local communities (Harkes & Novaczek, 2002; Wiadnya *et al.*, 2011) and the availability of external support to build local capacities and enable institutional change (Warren & Visser, 2016). It is also reported that increasing monetization (e.g., through mass tourism on coral reefs or shrimp aquaculture in mangroves) can lead to the loss of sense of social value, with potential implications for ecosystem's health (Arias-González *et al.*, 2017) (Annex 6.2).

Marine protected areas are differentiated in this analysis from locally managed marine areas by focusing on international waters and the high seas. While they have a strong potential to address the direct drivers of biodiversity loss in the oceans, more strategic siting, monitoring, and compliance is required (OECD, 2017) to stimulate institutional change, furthermore, addressing the fragmentation of the policy field is necessary to fully integrate the values of the marine environment into decisions. Marine spatial planning provides transparent, scientific-knowledge-based approaches to cross-sectoral prioritization and zoning, which can contribute to managing conflicts and creating legally accepted regulations to the use of oceans (Díaz-de-León & Díaz-Mondragón, 2013; IPBES, 2019a), although the active engagement of stakeholders with diverse knowledge and value systems is critical to rebalance the interests and the power relations regarding conservation and use (Frazão Santos *et al.*, 2019; Secretariat of the Convention on Biological Diversity & Scientific and Technical Advisory Panel – GEF, 2012; Trouillet, 2020).

Multilateral agreements can foster capacity development and legal mainstreaming, but on the ground implementation is highly context dependent and sometimes suffer from policy fragmentation and weak enforceability. International examples from the field of environmental law include among others the Aarhus Convention and the Escazú Agreement which fosters both social and environmental justice by aiming to ensure the public's right to information, right to participation and right to remedy in environmental matters (IPBES, 2019c; United Nations, 2018).

National biodiversity strategies and action plans and other national laws and ordinances (Annex 6.2) are reported to have a varying (but often limited) capacity to engage indigenous peoples and local communities due to constraints of human and financial capital, and a strong reliance on mainstream scientific knowledge (Escott *et al.*, 2015; Tengö *et al.*, 2017).

Environmental public interest litigation allows citizens and non-governmental organizations to enter the court and file litigation to represent the public interest in cases of environmental degradation or pollution. While environmental public interest litigation can represent diverse values and interests in the legal process, it often remains a reactionary act if not embedded in a strong judiciary (Carpenter-Gold, 2015; Schall, 2008), and not accompanied by stricter environmental law and enforcement (Wang & Gao, 2010).

Environmental impact assessment is a process to evaluate the likely environmental (and associated social, cultural, health-related and economic) impacts of a development project. Incorporating uncertainty and adaptive management (CBD environmental impact assessment guidelines) into environmental impact assessment can establish an adaptive process more open to diverse values, while combining environmental impact assessment with strategic environmental assessment can make room for institutional change. However, several challenges are acknowledged, especially for the inclusion of IPLCs (Craik, 2017; Quintero, 2012).

Expanding food market transparency (e.g., through reduced food taxes or public procurement rules) was initiated by several countries after the 2007-2008 financial crisis to reduce volatility (Clapp, 2009; Minot, 2014). Beside stabilizing prices, such interventions could merge social and environmental objectives (e.g., green public procurement in the European Union), qualifying the conventional view of transparency into notions of effective transparency that contributes to aligning business incentives to more positive socio-ecological outcomes (Stromberg & Ituarte-Lima, 2021). However, to enable integration and institutional change, food market transparency needs to expand to the whole value chain, target the most vulnerable groups, and respect cultural values and eating habits.

The **legal control over pesticide use** regulates the manufacturing, trade, use and disposal of pesticides through national and international regulations, but does not address the root causes that lead to the overuse of pesticides. To unlock its transformative potential, agroecology and other sustainable practices need to be

upscaled (FAO, 2017; IPES-Food, 2015; Muller *et al.*, 2017; Rockström *et al.*, 2017). Traditional land use practices of indigenous peoples and local communities rely on a limited use of pesticides, and also contain remediation practices to reduce the impacts of pollution (Sandlos & Keeling, 2016), therefore their inclusion might contribute to knowledge and capacity development and a more integrated and adaptive approach to pesticide use.

Commodity chain regulations (e.g., land use moratoria or zoning for soybean production in Brazil) help manage telecouplings and reconcile nature and agriculture (Gibbs *et al.*, 2015; Rudorff *et al.*, 2011), but leakages might occur (Arima *et al.*, 2011) and outcomes seem to depend on the economic pressure on natural resource use (i.e., commodity prices) (Harding *et al.*, 2021). Stronger coordination across the value chain (i.e., long-term collaborative relationships and increased trust between value chain actors) is needed to enable a more integrated and adapted approach (dos Reis *et al.*, 2020).

Trade bans – while can help reduce natural resource extraction and associated negative impacts (Ferretti *et al.*, 2020) – often have unintended consequences on local livelihoods and well-being, e.g., by disrupting local customary institutions or informal food systems of wild species (Parker *et al.*, 2020; Roe *et al.*, 2020). Emerging government proposals call for compulsory standards (e.g., Kvarnström & Zurek, 2021). Capacity development and collaborative partnerships at local levels might help increase their transformative potential.

Legal restrictions on natural resource use are often associated with burdens and benefits unequally shared, especially if local resource users (e.g., IPLCs) are not central to the instrument, and their impacts are highly dependent on enforceability. Combining restrictions with financial incentives (e.g., through payments for ecosystem services or subsidies) and, adding a voluntary and/or collective component to the restrictions (Hayes *et al.*, 2017; Sommerville *et al.*, 2010) might create room for wider transformations, especially if local actors are involved in the design (Kaczan *et al.*, 2017).

Lessons learnt from on-the-ground implementation

In the "brightspot" uptake cases, high degrees of participation and learning is common in the uptake or development of policy that can facilitate a shift towards transformative governance in legally protected areas and marine reserves. To better understand potential trade-offs requires learning from different stakeholders and engaging with different values and valuations of systems (e.g., Cuperus *et al.*, 2002; de Oliveira Leis *et al.*, 2019). For example, successful examples of biosphere reserves involved multiple stakeholders in the design and implementation process through mutual learning facilitated by companion modelling (Bouamrane *et al.*, 2016). This approach considers power relations between stakeholders, ensures dialogue and engagement, and contributes to a greater respect for collective, negotiated rules, lower enforcement costs, and sharing of costs and benefits (Bouamrane *et al.*, 2016). In a similar example a multiple-criteria decision analysis process facilitated co-learning between diverse actors holding conflicting perspectives in a context with high scientific uncertainty (Karjalainen *et al.*, 2013). Facilitated stakeholder dialogues, supported by structured and transparent analytical tools, enabled the considerations of different viewpoints preferences, which in turn helped the development of sustainable land management around the aquifer in question (Karjalainen *et al.*, 2013). Insights from Portugal further reinforce that deliberative ecosystem service appraisal processes can support transformative governance (Lopes & Videira, 2018). Group deliberations – engaging different stakeholders and building on scientific and local and practitioner knowledge – led to changes in participants' initial mental models, generated new alternatives, expanded perceptions on affected ecosystem services, and supported the formalization of evaluation criteria and decision rules (Lopes & Videira, 2018).

To engage in social learning, boundary objects, such as companion models, are very useful. A commonly used boundary object that supports shared meaning-making and diverse value elicitation are spatial maps (de Oliveira Leis *et al.*, 2019; Ioki *et al.*, 2019; Rohde *et al.*, 2006). Exploratory mapping can provide decision-makers with useful information about the values and knowledge of small-scale resource users, which can help identify potential conflicts and enhance support for protected areas (de Oliveira Leis *et al.*, 2019). The use of participatory geographic information systems permits local people to contribute their knowledge of the local environment to create georeferenced composite maps and generate a better understanding and representation of their sense of place (Ioki *et al.*, 2019). Developing alternative land use scenarios which combine local communities' knowledge with spatial information, can lead to a more sustainable, legitimate, and democratic decision-making and more effective land use plans (Ioki *et al.*, 2019; Shen *et al.*, 2015).

6.2.2.3 Social and cultural policy instruments

Social and cultural policy instruments include information-based instruments and voluntary or collective actions with an emphasis on the intertwined relationships between ecosystems and sociocultural dynamics. Altogether, seven social and cultural policy instruments were assessed **(Table 6.4)**.

Description of the social and cultural instruments

The biggest potential to support transformative change was attributed to *co-management*. Although implemented in highly different forms across the world (Soliku & Schraml, 2020), co-management is likely increasing the positive ecological and socio-economic outcomes of protected areas by empowering local people, reducing economic inequalities, and maintaining livelihood benefits (Oldekop *et al.*, 2016). It can ensure a more equal distribution of the costs and benefits of conservation and reconcile different values and interests, provided that trade-offs and uneven power relations are recognized and addressed (Fedreheim & Blanco, 2017; Kimengsi *et al.*, 2019). Specific cultural and ecological contexts are important for successful co-management, making any model hard to upscale, although local leaders, social capital and incentives were found to be crucial factors of success.

Environmental education is designed to increase environmental literacy and positively influence the public attitudes towards nature. Since education in general conveys a specific value system, as well as the concepts of what knowledge is legitimate, and sets aspirations for what constitutes well-being, education has a strong influence on social norms and lifestyles. To increase the transformative potential of environmental education, there is a need to respect diverse ways of knowing and learning, including indigenous approaches, as well as experiential, sensory, or arts-based ways of cognition. These aspects also need to be

Table 6 4 **Comparing existing social and cultural policy instruments in terms of their transformative potential.**

Potential for change	Name of policy instrument	Assessment criteria: Address *status quo*	Incorporate diverse values	Foster institutional change	Promote capacities	Integrative & adaptive	Potential scale of implementation	Key influencers of implementation
More transformative	Co-management	●	●	○	●	○	Global, National, Subnational, Local	Intergovernmental organization; (Sub-)national governments; NGOs and donors; Private sector; Civil society groups and communities; Academia and other educational bodies
More incremental	Environmental education	●	○	○	●	○	Global, National, Subnational, Local	Intergovernmental organization; (Sub-)national governments; NGOs and donors; Civil society groups and communities; Academia and other educational bodies
More incremental	Certification and labelling	●	○	○	○	○	Global, National, Subnational, Local	Intergovernmental organization; (Sub-)national governments; NGOs and donors; Private sector; Civil society groups and communities
More incremental	Public information instruments	○	○	○	●	○	Global, National, Subnational, Local	Intergovernmental organization; (Sub-)national governments; NGOs and donors; Academia and other educational bodies
More incremental	Behaviour nudges for reduced consumption	●	○	○	○	○	Global, National, Subnational, Local	Intergovernmental organization; (Sub-)national governments; NGOs and donors; Private sector; Civil society groups and communities
More incremental	Socially responsible investments	●	○	○	○	○	Global	(Sub-)national governments; NGOs and donors; Private sector
Maintaining *status quo*	Corporate social responsibility	○	○	○	○	○	Global, National	NGOs and donors; Private sector

Potential contribution to transformative governance: High ● ○ ○ Low

Scale of implementation: Global, National, Subnational, Local

Key influencers: Intergovernmental organization; (Sub-)national governments; NGOs and donors; Private sector; Civil society groups and communities; Academia and other educational bodies

considered in formal education systems (Beery & Jørgensen, 2018; Gerofsky & Ostertag, 2018; Slivka, 2016; White *et al.*, 2018). Through education, we can also contribute to the redistribution of power and rights, so that all can assume responsibility and control over their lives and futures.

Certification and labelling are means for providing accurate, understandable, verifiable and reliable information to consumers to allow them to adjust their purchasing behaviour to a more sustainable level. Certification could better contribute to sustainability goals if targeted on areas of high nature conservation value (Hole *et al.*, 2005), and social and economic development priorities. Governments can facilitate the impact of certification schemes by promoting uptake and supporting strategic targeting through complementary policies (Tayleur *et al.*, 2017).

Public information instruments, such as public guidelines or awareness raising campaigns, aim to foster more sustainable consumer choices by offering information on production characteristics or environmental and health implications of products. While they have a prior focus on instrumental values, information provided on, e.g., cruelty-free production, animal rights or the ethical considerations, allows for intrinsic and relational values to be represented. Still, the literature is inconclusive on the effectiveness of public information instruments, particularly for the average consumer who may not display strong environmental behaviours (Spaargaren *et al.*, 2013; Stern, 2000).

Behaviour nudges for reduced (or more sustainable) consumption are implemented in the food, energy and water sectors, among others. Their architecture is highly heterogeneous, ranging from peer comparison, social norms and group identity to feedback on the (environmental, health or ethical) consequences of buying the product, among others (Bonini *et al.*, 2018). Nudges can strictly speak to instrumental values or can also bring in the relational or intrinsic values of nature as framing conditions of consumption. Their effectiveness is highly context-dependent, and their implementation raises several ethical concerns related to transparency and paternalism (Raihani, 2013; Schubert, 2017). Combination with other instruments and increased transparency might help improve their transformative potential (Schubert, 2017).

Socially responsible investments combine a dominant financial logic with an ethical logic prioritizing environmental, social or sustainability impacts (Chatzitheodorou *et al.*, 2019), which can complement but also compete with each other, depending on contextual factors (Yan *et al.*, 2019). The goals of socially responsible investments can reflect diverse values, but these often follow an instrumental logic. Increasing transparency and improved consistency are important steps to increase the transformative potential of socially responsible investments (Widyawati, 2020).

Corporate social responsibility acknowledges that companies have the potential and responsibility to make a substantial contribution to arresting declines in biodiversity and ecosystems services. Several voluntary standards and instruments are in place, e.g., International Finance Corporation (IFC) performance standards on environmental and social sustainability, the extractive industries transparency initiative, the United Nations guiding principles on business and human rights, or the social licence to operate (Bice, 2014; Moffat *et al.*, 2016; Prno & Scott Slocombe, 2012). Still, little progress has been achieved in terms of involving the business community in protecting biological diversity worldwide, partly because corporate social responsibility activities are often detached from everyday business operations (Addison *et al.*, 2018; Bhattacharya, 2013; Overbeek *et al.*, 2013).

Lessons learnt from on-the-ground implementation

Many brightspot uptake cases illustrated the willingness of communities, managers and other decision-makers to consider the socio-ecological complexity of the systems in which potentially transformative rights-based and socio-cultural policy interventions were applied (Annex 6.1). Recognizing the importance of diverse values, knowledge systems, and stakeholders, as well as polycentric governance systems (Misra & Kant, 2004; Ressurreição *et al.*, 2012), already represents a recognition of intertwined, complex adaptive systems, and an attempt to build resilience in these systems (Biggs *et al.*, 2015).

Other features of complex adaptive systems (Preiser *et al.*, 2018) also informed the ways in which the different policy support tools were applied. Several studies highlighted the importance of context-dependency in designing good policy processes towards transformative governance (e.g., Misra & Kant, 2004; Mutenje *et al.*, 2019). Similarly, acknowledging socio-ecological complexity means recognizing the importance of diverse values and worldviews in shaping feedback between ecological, cultural and economic processes (Preiser *et al.*, 2018). Processes that link values and perceptions of different stakeholders, and that probe the interactions between social, economic and cultural diversity can help identify management priorities in complex systems (Iniesta-Arandia *et al.*, 2015; Misra & Kant, 2004; Ressurreição *et al.*, 2012). If such consideration of diverse values goes beyond a local system, they can recognize the radical openness of complex adaptive systems (Farjad *et al.*, 2017; Ressurreição *et al.*, 2012). For example, in the case of marine protected areas support in Europe, understanding how different values at different scales affect the complex relationship between changes of ocean biodiversity, ecosystem services and human well-being helped increase the effectiveness of cross-scale policy design (Ressurreição *et al.*, 2012).

Policy support tools that foster collaborative learning, such as scenario-based methods and futures thinking, provide another option for navigating the uncertainty and dynamic nature of complex adaptive systems (Lovrić *et al.*, 2018; Thompson & Friess, 2019). For example, in exploring the consequences of natural resource management actions informed by participatory multi-criteria decision analysis, participants in a mangrove-dominated system in Thailand revealed potential unintended consequences resulting from complex human-nature and stakeholder relationships. This allowed stakeholders to revise their preferences and facilitated a movement towards more effective mangrove management alternatives (Thompson & Friess, 2019).

Of the uptake cases assessed here, very few concerned customary and socio-cultural policy instruments. Yet the use of these instruments strongly aligns with the complex adaptive nature of socio-ecological systems, in particular its intertwined social and ecological relationality. For example, in the management of Ejido (agrarian form of collective property) in the Maya Zone of Quintana Roo, Mexico, internal customary rules acknowledge the complex, system-wide interactions and embrace diversity in tenure types and land use management options. As a result, forest with useful species was well-conserved, transitional forest for rotational agriculture, and areas linked to ancient Mayan civilization were managed in accordance with its cultural significance (Dalle *et al.*, 2006).

6.2.2.4 Rights-based and customary policy instruments

Rights-based and customary instruments aim to strengthen collective rights and customary institutions of indigenous and local communities that promote an equitable and fair management of natural resources. Altogether 4 rights-based and customary instruments were assessed **(Table 6.5)**, three of which can be considered as umbrellas for several diverse practices. A common feature is that all four instruments build on relational and intrinsic values and enable the interaction among (and reconciliation of) different values of nature. Although there is a growing tendency of implementing rights-based and customary instruments, they are not always well-integrated across sectors leading to policy incoherence and hindering institutional transformation. The legal recognition of customary instruments is key to the legitimization of ILK-based practices but combining them with other types of instruments might have adverse effects especially if integration happens in a top-down fashion (Borrini-Feyerabend, 2010; A. Kothari *et al.*, 2013).

Table 6 5 **Comparing existing rights-based and customary policy instruments in terms of their transformative potential.**

Potential for change	Name of policy instrument	Assessment criteria					Potential scale of implementation	Key influencers of implementation
		Address *status quo*	Incorporate diverse values	Foster institutional change	Promote capacities	Integrative & adaptive		
More incremental	Other effective area-based conservation measures (OECMs)	Medium	High	High	Medium	Medium	National; Subnational; Local	Intergovernmental organization; (Sub-)national governments; NGOs and donors; Civil society groups and communities
More incremental	ILK Revitalization	Medium	High	Medium	High	Medium	National; Subnational; Local	(Sub-)national governments; NGOs and donors; Civil society groups and communities; Academia and other educational bodies
More incremental	IPLC-led codes of ethical conduct	Medium	High	Medium	Medium	High	National; Subnational; Local	Intergovernmental organization; (Sub-)national governments; Private sector
More incremental	Free, prior and informed consent	Medium	High	Medium	Medium	Medium	National; Subnational; Local	(Sub-)national governments; Private sector

Potential contribution to transformative governance
High ● ● ● Low

Scale of implementation
Global
National
Subnational
Local

Key influencers
Intergovernmental organization
(Sub-)national governments
NGOs and donors
Private sector
Civil society groups and communities
Academia and other educational bodies

Description of rights-based and customary policy instruments

Other effective area-based conservation measures (indigenous and community conserved areas and territories) are areas designated for nature conservation outside of legally protected areas, such as private protected areas, land stewardships, Indigenous Community Conserved Areas (ICCAs) or sacred natural sites. Incorporating customary institutions and management systems governed by IPLCs in other effective area-based conservation measures is important as they are based on local knowledge and encoded in complex cultural practices, relational values, usufruct systems, spiritual beliefs, kinship-oriented philosophies, and principles of stewardship ethics (Berkes *et al.*, 2000; Fernández-Llamazares *et al.*, 2016; Kohn, 2013; Walsh *et al.*, 2013). Formal recognition of IPLC rights over their territories does not only address some of the human rights violations (Kohler & Brondizio, 2017) but it is also a critical factor to ensure the effectiveness of other effective area-based conservation measures, together with knowledge-sharing and mutual learning processes (Aerts *et al.*, 2016; Irakiza *et al.*, 2016; Jonas *et al.*, 2017).

Indigenous Local Knowledge (ILK) revitalization policies contribute to recognizing and restoring customary institutions of indigenous peoples and local communities for ecosystem management (Aikenhead, 2001; McCarter *et al.*, 2014; McCarter & Gavin, 2014; Tang & Gavin, 2016). Indigenous and local knowledge revitalization efforts are most effective when controlled and managed by the communities involved (Fernández-Llamazares & Cabeza, 2018; McCarter *et al.*, 2014; Singh *et al.*, 2010; Sterling *et al.*, 2017). Moreover, it is important that revitalization efforts consider the gendered nature of knowledge and the crucial role of women in knowledge transmission (Díaz-Reviriego *et al.*, 2016).

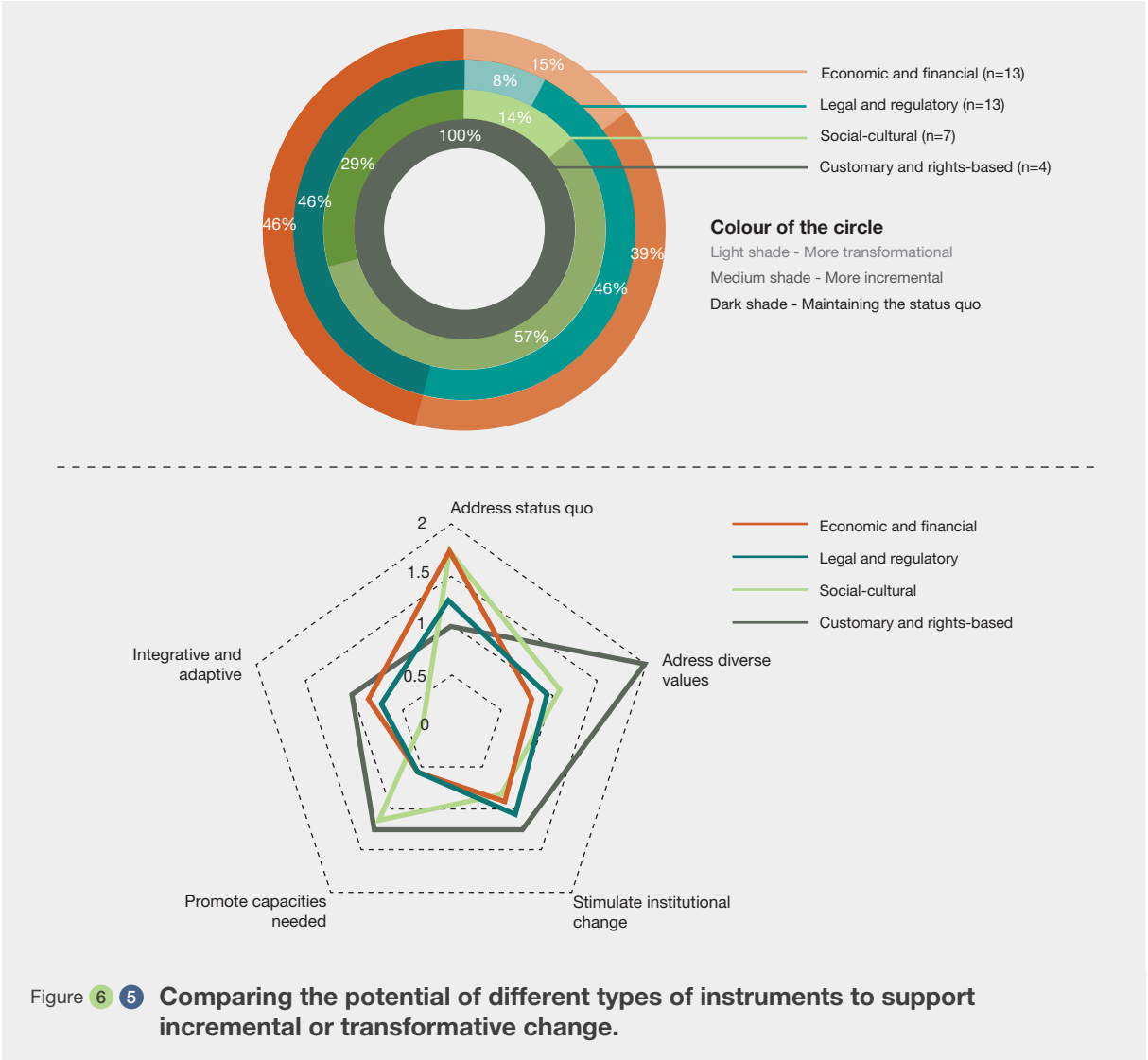


Figure 6 5 **Comparing the potential of different types of instruments to support incremental or transformative change.**

IPLC-led codes of ethical conduct (e.g., Akwé:Kon Guidelines and The Tkarihwaié:ri Code of Ethical Conduct (Secretariat of the Convention on Biological Diversity, 2004, 2011)) set up inclusive participatory mechanisms and enable the interaction of different knowledge systems. They can contribute to empowerment and capacity development at the local level, but to fully operationalize this potential decentralized power in decision-making and cross-sectoral policy integration is necessary (Markkula *et al.*, 2019).

Free, prior and informed consent (FPIC) principles allow indigenous peoples to give or withhold consent to a project that may impact their life and territories and creates a platform to negotiate the conditions under which the project is designed, implemented, monitored and evaluated. Although FPIC principles face several challenges, including context-dependent and inconsistent legal interpretations (Anaya, 2005; Dehm, 2016; Perreault, 2015; Pham *et al.*, 2015), they help realize the simultaneous support of nature conservation and human well-being (Magraw & Baker, 2006; Page, 2004). The transformative potential of FPIC principles can largely be enhanced if IPLCs operationalize it through their own decision-making mechanisms (Papillon & Rodon, 2020; Schilling-Vacaflor, 2017).

6.2.2.5 Comparison across the different types of policy instruments

Based on the assessment of each individual instrument in the previous subsections, we can compare the different instrument types according to how far they are able to support system-wide changes **(Figure 6.5)**. The upper segment of the figure indicates that over half of the economic and legal instruments, two-third of socio-cultural instruments, and all customary and rights-based instruments assessed had some potential to support system-wide changes (light and medium shade areas on the graph), although more incremental than transformative.

The lower segment of **Figure 6.5** compares the four instrument-families across the mean values of the criteria we used for the assessing their transformative potential. The figure highlights the different strengths and weaknesses of instrument-families, being customary and rights-based instruments the most capable of addressing diverse values.

In addition, the analysis of the policy uptake "bright-spot" cases revealed three key themes for how policy instruments and support tools can engage diverse stakeholders, values and knowledge systems, and support dimensions of positive transformative governance **(Figure 6.6)**.

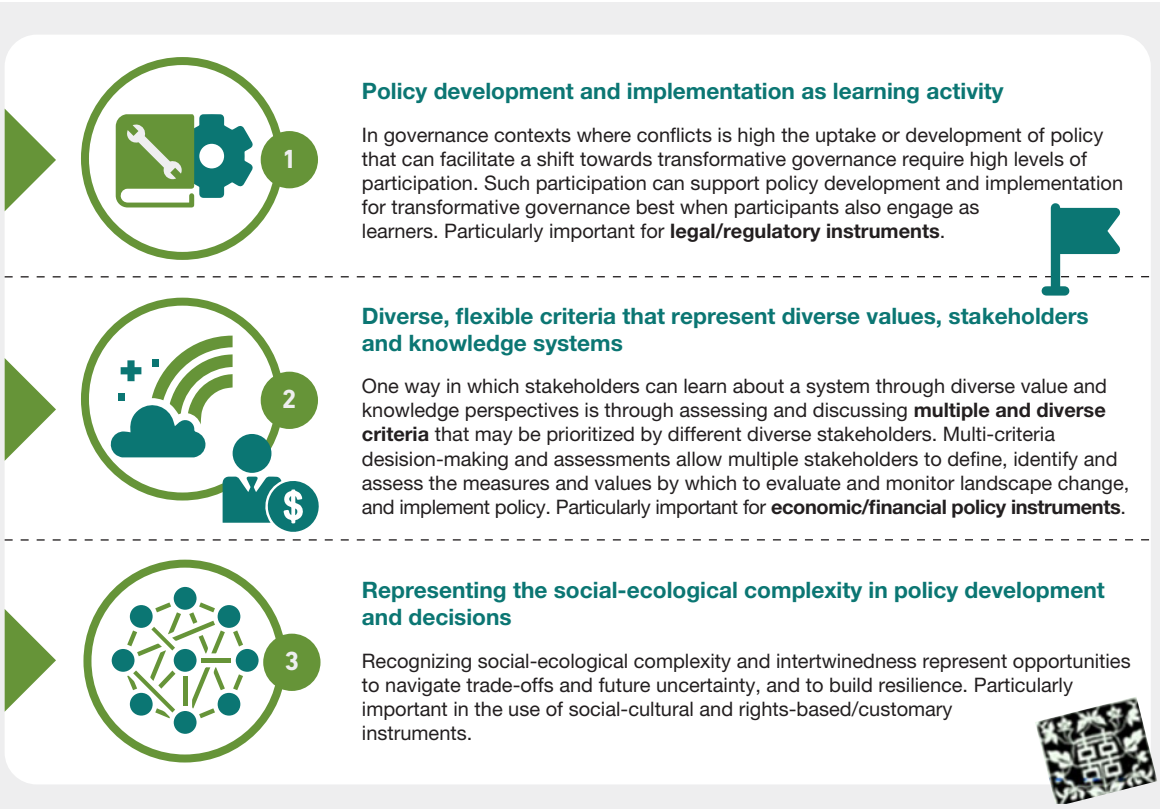


Figure 6 6 **How to increase the transformative potential of policy instruments by engaging diverse stakeholders, values and knowledge.**

6.2.3 Linking policy and practice: supporting transformative governance in cross-scale initiatives and projects

This section analyses global initiatives that are responsible for governing biodiversity management across various scales. A total of 46 global biodiversity-related initiatives were identified and screened through their websites (particularly the mission statements and "about us" sections) against the different dimensions of transformative governance (as defined in Section 6.1.2.1). To better understand how the diverse value approaches discovered during the screening exercise were operationalized in practice, one case study per initiative was identified and assessed in more depth (except 3 initiatives where no suitable cases were found).

Case studies were identified through a literature review that were associated to the different initiatives in each of the below three ways:

- Linked to knowledge management action, without any direct link, support, and/or influence from the initiatives.
- The case study is part of the initiatives' mainstreaming or capacity-building effort, with direct link, support, and/or influence from the initiatives.
- The case study is being inspired or influenced by the initiative, but no direct link (funding, assistance, etc.) between case study and the initiatives.

Case studies were then assessed against diverse value approaches and dimensions of transformative governance (i.e., how far they are able to address the *status quo*, address diverse values, stimulate institutional change, promote capacities, and act in an integrative and adaptive way), which was used to identify the different ways in which projects incorporated diverse value approaches in policy and practice. The detailed methodology and the list of assessed initiatives and case studies assessed are shared in Annex 6.2.

6.2.3.1 Cross-scale initiatives for biodiversity conservation

Nearly all of the initiatives (91%) alluded to diverse (i.e., more than one of the following list), holistic, health, economic, social and biophysical value approaches on their websites **Figure 6.7**. Instrumental (n=42, 91%) and relational (n=43, 93%) were more often reflected than intrinsic values (n=27, 59%). Initiatives spanned development, use (n=33, 72%) and conservation (n=38, 83%) decision-making contexts. They were focused on global challenges of agriculture (n=40, 87%), fisheries (n=36, 78%), protected areas (n=35, 76%), and large-scale and rapid transformation (n=29, 63% – overlapping with agricultural changes). Local knowledge was acknowledged in 28 initiatives (61%). Initiatives focused on mainstreaming, capacity building, policy/advocacy and stakeholder engagement (all engaged in at least two of these categories) and worked with multiple stakeholder groups, including national governments, donors and business. Most of them (n=41, 89%) have a direct policy focus, including policy formulation, policy recommendations, implementation, or advisory activities. In this sense, many of the assessed initiatives act as science-policy interfaces, i.e., they provide information, knowledge and guidance to national and sub-national policy decision-makers to support more robust, just and sustainable decisions.

The Economics of Ecosystems and Biodiversity was the only initiative that expressed solely one value category on its website (it should also be noted that the Economics of Ecosystems and Biodiversity's case descriptions mentioned more diverse values). All the rest of the initiatives considered at least 2 types of values, and on average 4 values were to a certain extent referred to. Among the types of values, intrinsic values were the least referred (27 initiatives covered explicitly intrinsic values), whereas instrumental and relational values were more often reflected (n=43 and n=42 respectively). While some initiatives articulated diverse values in their introduction, they were still classified as not considering diverse values due to the nature and work focus of the initiatives (e.g., the System of Environmental-Economic Accounting, SEEA, or the ValuES project).

6.2.3.2 Case study assessment

The case studies show how cross-scale initiatives stimulate positive transformation in acknowledging and considering diverse values within the natural resources and biodiversity management. As many as 43 case studies were identified from the 46 initiatives assessed above spanning across the national and local scales.

Ten different groups of cases were identified in relation to transformation towards a governance more accommodative to diverse values. These are explained in **Table 6.6** and **Figure 6.8**.

Many of the cases highlighted the importance of addressing nature's diverse values, particularly instrumental-relational values and instrumental-intrinsic-relational values **(Figure 6.9)**. Except three cases related to relational values (SwedBio on Quito dialogues, Global Alliance for the Rights of Nature; Akwé Kon Guidelines of CBD) and one to instrumental values (Protected Planet), all cases addressed instrumental values within the governance process. Two case studies specifically address relational-intrinsic values (Akwé Kon Guidelines and rights for nature). And 13 cases address only instrumental values, of which six cases are

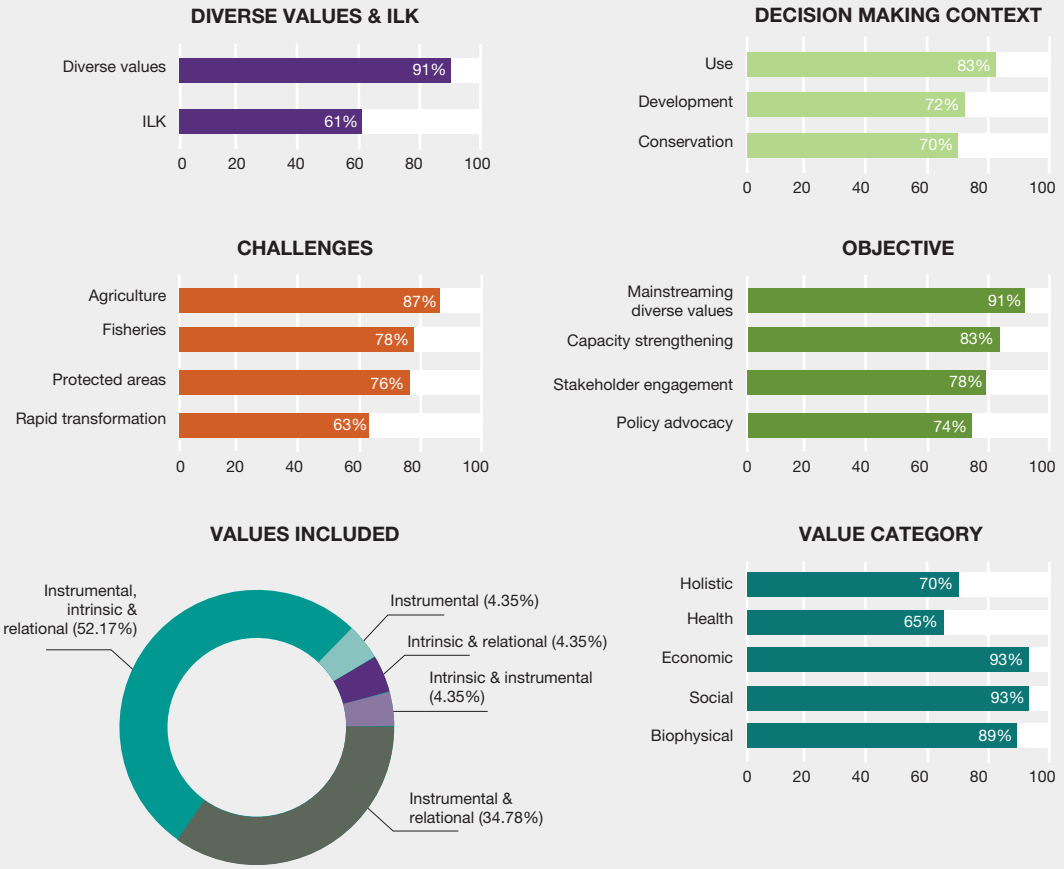


Figure 6 7 **Characteristics of assessed initiatives, showing the proportion of initiatives (n=46) that accounted for diverse values and indigenous and local knowledge (ILK), addressed specific decision-making contexts, objectives, and challenges, and accounted for different value types and categories.**

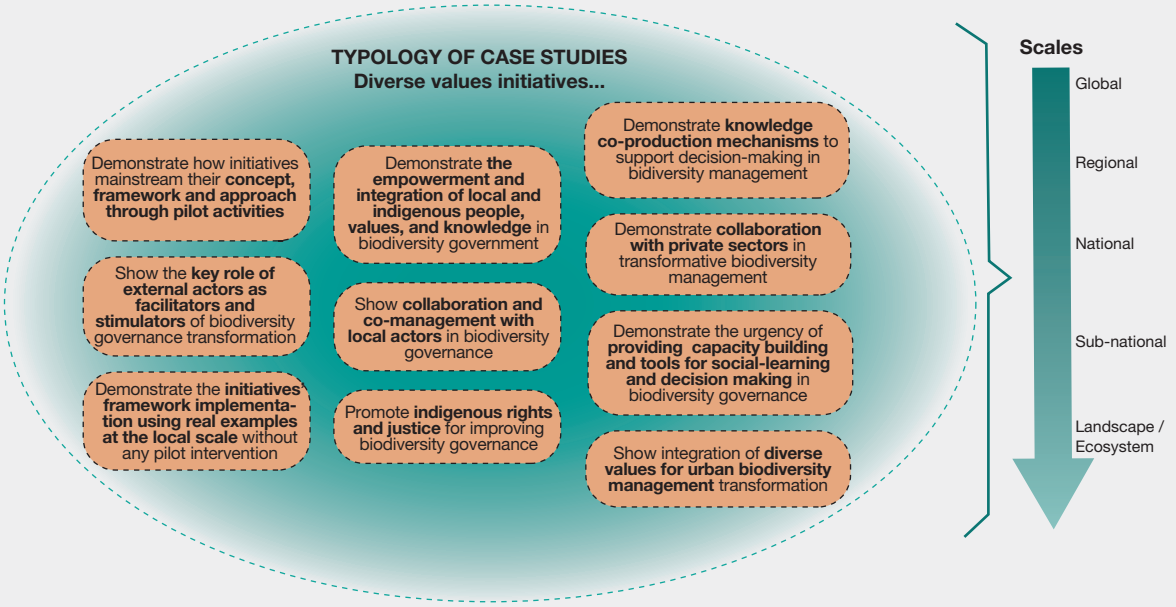


Figure 6 8 **Overview of the different typologies of case studies identified in the review.**

related to ecosystem accounting processes (TEEB, SEEA and WAVES) and natural capital accounting and business involvement (Natural Capital Coalition, WBCSD, We Value Nature), two are related to certification (EBBC, World Bank), three to international policy support initiatives (HELI, OECD-Environment Directive and UNCCD) and city region food systems (FAO).

Most of the case studies (28 out of 43 case studies) highlight the urgency to involve indigenous peoples and local communities in conservation. Ten case studies did not explicitly address indigenous peoples and local communities but indicate the need to be inclusive of all actors in their transformative actions, such as indicated in the Future Earth's Knowledge-Action Network programme (KAN), Food and Agriculture Organization's city food region systems (CRFS), European Union Business @ Biodiversity Platform (EU B@B Platform), and The Economics of Ecosystems and Biodiversity, among others. Only nine cases do not specifically involve indigenous peoples and local communities, as they are more focused on environmental accounting (WAVES and SEEA), natural capital assessments (We Value Nature; Natural Capital Coalition), forest data (World Resources Institute Global Forest Watch), global and international environmental governance (SwedBio reflection on Quito dialogues, OECD); and biodiversity monitoring (Birdlife, Protected Planet (UNEP-WCMC & IUCN WCPA)). The assessment, as other analyses from this section shows

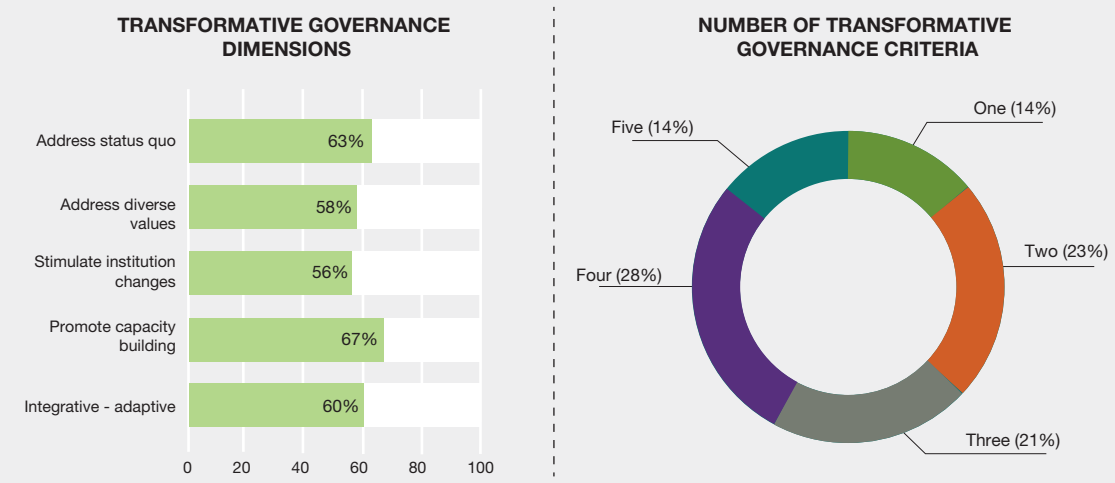


Figure 6 9 **Proportion of case studies (n=43) addressing individual transformative governance dimensions (left) and that addressed one to five of these criteria (right).**

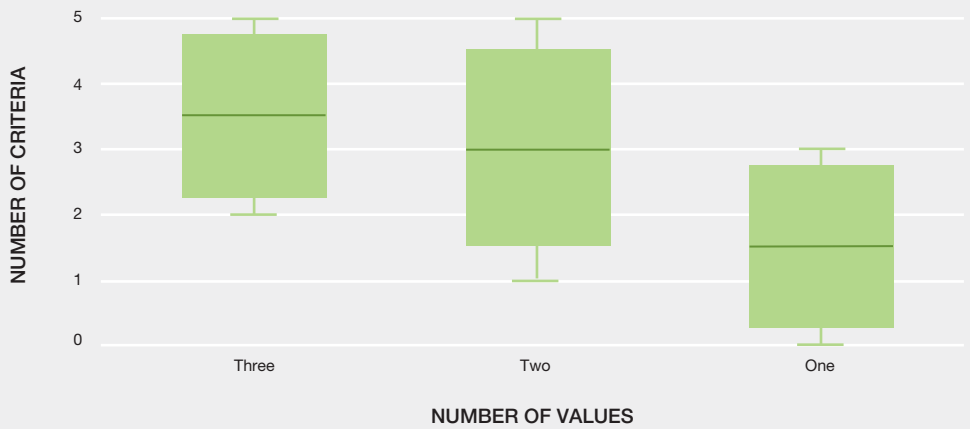


Figure 6 10 **Average transformative change criteria in studies with one, two and three different value dimensions, respectively (n=43 case studies).**

a dominance in *instrumental values, whereas intrinsic values* are the most underrepresented (22% of cases).

Out of 43 case studies, 27 on biodiversity management were identified as having high potential to stimulate transformative governance, as those case studies represent three or more transformative criteria **(Figure 6.9)**. These include cases representing e.g., the Akwé Kon Guidelines; Conservation International; Economics of Land Degradation, EU Business @ Biodiversity Platform; EKLIPSE; Global Alliance for the Rights of Nature; GIZ; KAN-Future Earth Network; IUCN; IISD; Natural Capital Project; OPPLA; SNRD Asia; SEEA, UNEP; UNESCO; We Value Nature; WHO; and ValuES.

Most of the case studies prompted capacity-building (29 case studies, 67%), addressed the *status quo* (27 case studies, or 63%) and included diverse values approaches (25 case studies or 58%). Capacity building was enacted through awareness raising, data and tools utilisation, bridging interests through social learning processes, and acknowledgement and utilisation of traditional and local knowledge in biodiversity and natural resources management. Of the diverse value approaches, about one-third of the case studies (15 case studies, 34%) simultaneously address instrumental-relational values and 10 case studies (23%) addressed instrumental-relational-intrinsic values **(Figure 6.9)**.

Addressing the *status quo* related to the production-consumption process (i.e., agriculture, food, certification, accounting system) and promoting equity in the process of managing biodiversity and ecosystem services (i.e., river rights, traditional local knowledge, etc.). In terms of the integrative-adaptive process, projects involved collaborative approaches such as co-management and co-production of knowledge to address complexity and uncertainty in biodiversity and ecosystem services management. Case studies that acknowledge/address diverse values tend to be more integrative-adaptive and overlap in most cases. The assessment also shows a strong association between the values and transformative dimensions: initiatives that are more diverse also address more dimensions of transformative governance **(Figure 6.10)**.

6.3 POLICY OPTIONS WITHIN AND ACROSS SECTORS THAT ENGAGE WITH DIVERSE VALUES OF NATURE FOR TRANSFORMATIVE CHANGE

This section aims at identifying the opportunities to trigger transformative change towards sustainability through policy options within and across sectors (identified as those most dependent on and with high impacts on nature). A systematic literature review (including academic and grey literature) of policy options was conducted that included identifying key words relating to various human well-being priorities (sectoral) and involve multiple challenges (cross-sectoral). The assessment was informed by the following guiding questions:

- How are diverse values of nature included in different sectors and/or cross-sectoral policies?
- How might the policy options contribute to transformative change towards sustainability?
- What are the benefits, challenges, gaps in the implementation of current policy options used across sectors from a diverse values of nature perspective?

6.3.1 Policy options within sectors

In this sub-section, we look at key issues related to planning and decision making within sectors linked to nature and human wellbeing and highlight the trends in policy options to address them.

6.3.1.1 Incorporating diverse values in decision-making for urban transformation

Urban transformation could denote emergent large-scale or rapid changes in cities (Feola, 2015) often with undesirable effects such as biodiversity loss and increasing disaster risks (Dhyani *et al.*, 2018; Nehren *et al.*, 2019a) and reduced interaction with nature, which negatively affects humans' health and well-being (IPBES, 2019a; Niemelä *et al.*, 2011). Policy responses include limiting city sprawl through encouraging densification (Scott *et al.*, 2016), creation of urban nature reserves, green corridors and parks (Barona *et al.*, 2020; Feyisa *et al.*, 2014; Grande *et al.*, 2016; Stoltz *et al.*, 2016), green infrastructure (Herzog, 2016; Madureira & Andresen, 2014), and using incentives to encourage landowners to preserve, restore or compensate for lost ecosystem functions (Apostolopoulou & Adams, 2019; Brink

& Wamsler, 2018; Hostetler, 2020; Mees & Driessen, 2011; Simmonds *et al.*, 2020).

Urbanization entails increasing settlement sizes and radical and broad-based changes to the form, metabolism, economy, demography and associated ways of life of settlements and ecosystems (Pickett *et al.*, 2013; Wamsler *et al.*, 2013). The "new urban transformation" may take the shape of peri-urban growth, declining urban densities and polycentric urban regions (McGranahan & Satterthwaite, 2014). Moreover, to cater to cities' large consumption needs, their hinterlands often undergo large economic and technological shifts, and such urban–rural linkages can drive transformation of entire landscapes (Nehren *et al.*, 2019b). Nature experiences have been identified as critical for people's learning about and engaging in biodiversity conservation and sustainability (Beery *et al.*, 2015; Marcus *et al.*, 2016), but the changes in land-use cover and lifestyle associated with urbanization negatively affect people's experiences, sometimes referred to as the *'extinction of experience'* (Botzat *et al.*, 2016; Soga & Gaston, 2016). Several scholars warn of a negative cycle, where this lack of exposure can result in growing disaffection and poor understanding of nature – exemplified by nature phobias (Bixler & Floyd, 1997), and modernist preference for neat, uniform landscapes, which people might erroneously associate with ecosystem health (Kühne, 2012; Nassauer, 1992; Niemelä *et al.*, 2011). Policy responses have included biophilic planning and design (Beatley, 2011; Beery *et al.*, 2015; Scott *et al.*, 2016), targeting school children and youth for significant experiences in nature (Giusti *et al.*, 2014; Zanini *et al.*, 2020), and using the pedagogic function of the ecosystem services concept to *educate* decision-makers and the public (Beery *et al.*, 2016).

Urban transformations can also denote transformations of urban governance, such as from a bureaucratized welfare state to a more entrepreneurial form of city management, or conversions between public and private space (Harvey, 1989; Healey, 2006). This may affect the distribution, access to, and experience of nature and ecosystem services, especially for poorer or racialized city dwellers (Anguelovski *et al.*, 2019; Ernstson, 2013; Mullin *et al.*, 2018; Villamagna *et al.*, 2017). As a larger number of actors beyond local governments have emerged in steering the "urban sector" – including businesses, citizens, and different interest organizations – considering diverse values in decision-making is argued to make urban climate or environmental governance more efficient, responsive, fairer and more legitimate (Anguelovski & Carmin, 2011; Mayer *et al.*, 2012; Renn & Schweizer, 2009). Policy responses include different techniques for citizen participation and dialogs (Brink & Wamsler, 2018; Mayer *et al.*, 2012), mapping (Ertiö, 2015; Raymond *et al.*, 2016), and co-production (Mees *et al.*, 2016, 2017; Raymond, Giusti, *et al.*, 2017). However, real participation of poorer segments is rare, unless they are specifically targeted, and more radical social change or resistance to such marketized or entrepreneurial governance arrangements might be more likely to emerge from civil society (Apostolopoulou & Adams, 2019; Brink & Wamsler, 2018; Woroniecki *et al.*, 2020).Attempts to capture values of different stakeholders is done through assessment, valuation, participatory geo-spatial mapping (Brown & Fagerholm, 2015; García-Nieto *et al.*, 2015; Paracchini *et al.*, 2014; Tyrväinen *et al.*, 2007; van Riper *et al.*, 2012).

Other emerging policy options in the urban context include:

Nature-based solutions, which is an umbrella concept for working with and enhancing nature to help address societal challenges (Fink, 2016; Frantzeskaki *et al.*, 2017; Seddon *et al.*, 2020; Woroniecki *et al.*, 2020), through *'an ecosystem services approach within spatial planning policies and practices'* (Scott *et al.*, 2016, p. 267). The approach emphasizes multifunctionality (Herzog, 2016; Madureira & Andresen, 2014) and includes a broad range of issues from climate mitigation and adaptation to recreational space, drainage management and ecological connectivity and habitats (Scott *et al.*, 2016). As it is based on evidence-based understanding of local ecologies, it can include indigenous and traditional knowledge (Cohen-Shacham *et al.*, 2019). However, with regards to including diverse values, the *catch-all* nature of the concept is also the biggest question mark, since nature-based solutions vary considerably regarding how much they support biodiversity (versus monocultures or green-grey structures) and to what extent they are designed and built by or consider knowledge of local communities (Seddon *et al.*, 2020).

Ecosystem-based adaptation and disaster risk reduction (EbA and Eco-DRR) entail using the natural capacity of ecosystems to directly buffer against hazards (e.g., vegetation or wetlands regulating water to fight flooding, or trees providing shade and temperature reduction to fight heatwaves) as well as to indirectly increase people's capacity to deal with such hazards (GIZ, UNEP-WCMC and FEBA, 2020). Used in harmony with other climate adaptation measures (Brink *et al.*, 2016; Geneletti & Zardo, 2016; Kasecker *et al.*, 2018; Lange *et al.*, 2019; Nehren *et al.*, 2019a; Sandholz, 2018), EbA and Eco-DRR may also result from conservation efforts or policy mixes based on intrinsic values of nature (Brink *et al.*, 2016; Kasecker *et al.*, 2018; Scarano, 2017; Wamsler *et al.*, 2014). Cities with a strong focus on biodiversity conservation may find themselves in a good position to implement EbA e.g., Durban in South Africa (Roberts *et al.*, 2012). While such synergies are often stressed, urban authorities or park managers still need to balance trade-offs, through assessing species' suitability for different hazards

(contribution to biodiversity, and user perceptions through a host of existing concepts and methodologies such as inclusive risk governance (Challies *et al.*, 2016; Renn & Schweizer, 2009), community-based adaptation (Archer *et al.*, 2014; Dhar & Khirfan, 2016; Forsyth, 2014), and participatory vulnerability assessments (Ahmed *et al.*, 2012; OXFAM, 2002; Prabhakar, 2015; Rizvi *et al.*, 2016; Wilk *et al.*, 2018)).

Biocultural approaches – biocultural diversity, focusing on human perceptions and use of biodiversity across different cultural groups (Bermudez *et al.*, 2017; Botzat *et al.*, 2016; Brunet *et al.*, 2020; Fischer *et al.*, 2018; Fischer & Kowarik, 2018; Grande *et al.*, 2016; Gunnarsson *et al.*, 2017; Hand *et al.*, 2016; Hwang & Roscoe, 2017; Sourdril *et al.*, 2017; Voigt & Wurster, 2015; Wang *et al.*, 2019; Zanini *et al.*, 2020), biocultural approaches are gaining traction in global and local sustainability debates (Haider *et al.*, 2020; Hanspach *et al.*, 2020; McMillen *et al.*, 2020; Merçon *et al.*, 2019). Biocultural diversity describes the *inextricable link* between biological and cultural diversity (Cocks, 2010; Cocks & Wiersum, 2014; Maffi, 2007, p. 267) and the benefit for conservation (Maffi & Woodley, 2010). Recently, European researchers have attempted to *relaunch* biocultural diversity as a conceptual foundation for urban greenspace planning, capable of overcoming challenges of the ecosystem services paradigm, along with a suggested framework of indicators for assessing urban biocultural diversity (Buizer *et al.*, 2016; Elands *et al.*, 2018; Vierikko *et al.*, 2016). Examples from the Global South also exist, e.g., focusing on cultural and spiritual relations of non-traditional indigenous people with both natural and human-created biodiversity in South Africa (Cocks & Wiersum, 2014) and cultural heritage and popular feasts of syncretic religions in Brazil (Mendonça, 2014). The reinvented, urban version of the biocultural diversity concept has an explicit normative focus, which goes beyond safeguarding cultural practices and values, aiming to re-connect people with nature and to enhance the diversity of nature as part of an urban transformation towards sustainability (Vierikko *et al.*, 2017). It further enables migrants from rural areas to stay in touch with their practices, food and health resources – including related knowledge exchange between groups (Stålhammar & Brink, 2020; Vierikko *et al.*, 2016).

Biocultural approaches commonly address intrinsic, instrumental and relational values (Hanspach *et al.*, 2020) arising from a co-existence of different cultures (e.g., In terms of religion, race, place of origin, urban subculture) (Elands *et al.*, 2018). However, methodological development and testing is needed in cities, with calls to produce actionable knowledge that consider questions of power, gender and transformations (Hanspach *et al.*, 2020; McMillen *et al.*, 2020).

Biophilia – biophilic design and perceived sensory dimensions cantered around creating city environments that can stimulate and awaken humans' inherent love and longing for nature (Beatley, 2011; Beery *et al.*, 2015; Scott *et al.*, 2016) – and counter the stress related to urbanization (Bratman *et al.*, 2019; Cox *et al.*, 2017; Grahn & Stigsdotter, 2010; Hartig & Kahn, 2016; Stoltz *et al.*, 2016), that includes prescribing time in nature called "green prescriptions" (Kaplan, 1995;Bell *et al.*, 2019)

Recent understandings of nature and place values as long-term and premeditated, rather than immediate or direct (Marcus *et al.*, 2016; Raymond, Kyttä, *et al.*, 2017; Stoltz & Schaffer, 2018). Has led to an increased focus on direct, sensory or embodied experiences in nature (Beery & Jørgensen, 2018; Cooke *et al.*, 2016; Gunnarsson *et al.*, 2017; Raymond, Giusti, *et al.*, 2017; Stoltz, 2019). This emerging research agenda comes with new methodological challenges – not least regarding how to consider diverse values or justice aspects in urban planning and research. requiring new methods, indicators and metrics, capable of balancing objective (e.g., blood pressure and heart rate) and subjective data (Bell *et al.*, 2019; Raymond, Giusti, *et al.*, 2017).

Another perspective is that of children and areas for experimental play, considering that such nature experiences in childhood are especially formative (Balmford *et al.*, 2002; Barthel *et al.*, 2018; Giusti *et al.*, 2014, 2018). Policy examples include a child-centred perspective in urban planning, playgrounds that integrate natural elements for free play, app-based exploration of nature, and outdoor preschools.

Sustainable urban transformations (e.g., urban greening, densification, and climate adaptation) may also produce *undesired effect on* (access to) urban ecosystem services and biodiversity (Chu *et al.*, 2017; Rice *et al.*, 2020; Woroniecki *et al.*, 2020). For instance, scholars note how the "Smart City" planning paradigm, or digitalization more broadly reduce people's direct interaction and bonding with socio-ecological surroundings, with negative impacts on both health and affinity towards nature (Carmona, 2010; Colding & Barthel, 2017; Cox *et al.*, 2017). Another notable risk is that of "green gentrification" or the displacement of poorer and often racialized or marginalized residents caused by greening the city (Checker, 2011; Pearsall & Anguelovski, 2016).

There are still many *gaps in knowledge*. While more studies have appeared in recent years, there is still a dearth of research on (diverse values of) informal greenspaces and informal settlements, outside the Western context, where cities will grow the most (Adegun, 2018; Botzat *et al.*, 2016; Gopal & Nagendra, 2014; Ronchi & Arcidiacono, 2019; Roy *et al.*, 2018; Rupprecht & Byrne, 2018; Satterthwaite,

2020; Shackleton *et al.*, 2015; Stålhammar & Brink, 2020; Vollmer & Grêt-Regamey, 2013); remedies for the stress and lifestyle diseases associated with urbanization and digitalization that are fast becoming major public health issues (Bratman *et al.*, 2019; Cox *et al.*, 2017; Hartig & Kahn, 2016) requiring more research (Cox *et al.*, 2017; Hartig & Kahn, 2016; Soga & Gaston, 2016); the role of future studies in enhancing diverse values of biodiversity in urban transformations, and the need for envisioned future systems to be more transparent, open and collaborative, while dealing with both normative values and systemic issues (Beck & Forsyth, 2020; Fazey *et al.*, 2020; Wolfram *et al.*, 2016). One example is how large-scale transformations (whether urbanization or "sustainable" transformation) is experienced from the perspective of traditional knowledge systems (Lam *et al.*, 2020), and how such situated knowledge relates to normative, technical or scientific knowledge in urban environmental struggles (Brink *et al.*, 2016; Forsyth, 2014; McMillen *et al.*, 2020; Ruiz, 2018).

6.3.1.2 Incorporating diverse values of nature into land use decisions: Example of nuclear waste management

We highlight the utility of including diverse values of stakeholders in decisions related to land use through an example of nuclear waste disposal, generated during electricity production in Canada.

Nuclear systems represent a special challenge as the waste contains residual radioactivity and chemical toxicity that persists for a very long period of time, and radioactive waste management policies and approaches are often perceived as controversial (Bell, 2019; IAEA, 2020). Stakeholders are many, often have opposing views, and may be a source of conflict (Bell, 2019; Fischer *et al.*, 2019; IAEA, 2018, 2020; Mayhew & Perritt, 2020; Seaborn *et al.*, 1998). There is progress in the implementation of strategies for long-term used fuel management and deep geological disposal is the preferred option for nuclear waste management in several countries, (WNA, 2020a, 2020b).

Box 6 2 The case of the Canadian Nuclear Waste Management Organization and the consideration of indigenous knowledge.

The process to implement a long-term strategy for the management of used nuclear fuel in Canada, has a long history (Hare, 1977; Porter, 1978, 1980; Seaborn *et al.*, 1998). In 2002, the Government of Canada, through the *Nuclear Fuel Waste Act*, assigned this responsibility to the Nuclear Waste Management Organization (NWMO). Canada's plan, known as Adaptive Phased Management (APM), was approved by the federal government in 2007. The plan emerged from a nation-wide dialogue with Canadian and indigenous peoples and is guided by the values and objectives they consider important for managing used nuclear fuel (NWMO, 2005). Since 2010, the Nuclear Waste Management Organization has been engaged in a site selection process to identify a site where Canada's used nuclear fuel can be safely isolated in a deep geological repository. The project will only be implemented with involvement of the interested indigenous communities in the area, and surrounding communities (NWMO, 2010, 2020a). Given the hazard to humans and non-human biota posed by the used nuclear fuel itself and considering the Adaptive Phased Management Project is expected to result in $23B CAN (2015 dollars) in expenditures over 150 years that will have implications for social and economic conditions locally and regionally, it is easy to draw linkages to each of the 17 SDGs. The Nuclear Waste Management Organization recognizes that indigenous knowledge, including strong relational values to nature, will be essential in understanding the project's contribution to sustainable development (Fischer *et al.*, 2015; FPP, 2020; Hill *et al.*, 2020; IPBES, 2019a; NWMO, 2010, 2016; Woroniecki *et al.*, 2020).

Policy considerations: Through the Impact Assessment Act, the federal government has confirmed the regulatory requirement to integrate indigenous and community knowledge, wherever possible, to support a sustainability-based assessment framework (ICCA, 2019). Indigenous peoples in Canada hold Aboriginal and Treaty rights recognized and affirmed by section 35 of the Constitution Act. Recognizing these rights, in 2005, the Nuclear Waste Management Organization established the Council of Elders and Youth, an independent advisory body of indigenous elders and youth from across Canada who have been instrumental in the development of Nuclear Waste Management Organization policy. These policies formally committing that indigenous knowledge will inform all aspects of the Nuclear Waste Management Organization's work while ensuring that indigenous knowledge is respected and protected, and that the nuclear waste organization will contribute towards reconciliation (Díaz *et al.*, 2015; Hill *et al.*, 2020; Tengö *et al.*, 2014; TRC, 2015). The Nuclear Waste Management Organization also issued an Environmental Responsibility Statement that promotes the commitment that diverse values, including the inter-relationships between human-ecological systems, will be accommodated (NWMO, 2020b).

Building organizational apacity: Consistent with the literature, indigenous community members and The Council of Elders and Youth have confirmed to the Nuclear Waste Management Organization that opportunities to learn and work together will establish the reciprocal foundation of trust and respect essential for success (Arctic Council, 2015; Council of Elders and Youth, 2016; Croal *et al.*, 2012; Eckert *et al.*, 2020; Muir, 2018; Tengö *et al.*, 2017; The Nature Conservancy, 2017). Acknowledging that 'integration' of indigenous knowledge with western scientific discourse for decision making is often rife with power

imbalances (Johnson *et al.*, 2016; Stevenson, 1996; Tengö *et al.*, 2014, 2017; Usher, 2000) and misrepresentations (Arctic Council, 2015; Curran & M'Gonigle, 1999; Eckert *et al.*, 2020; FPP, 2020; Hill *et al.*, 2020; Johnson *et al.*, 2016; Mayhew & Perritt, 2020; McGregor, 2008; Muir, 2018; Noble, 2016; Okediji, 2018; Reo *et al.*, 2017; Reo & Ogden, 2018; Stevenson, 1996; Tengö *et al.*, 2017; Usher, 2000; Whyte *et al.*, 2016), the Nuclear Waste Management Organization actively works to successfully include indigenous perspectives within the project by addressing the knowledge gap that western scientists have with respecting indigenous knowledge in planning and decision-making (Díaz *et al.*, 2015; FPP, 2020; Hill *et al.*, 2020; Tengö *et al.*, 2014, 2017).

Participatory decision-making in action: In line with the discourse on the need for broad public engagement and meaningful participation in developing and implementing large-scale infrastructure projects is well documented (e.g., Arnold & Hanna, 2017; Bice, 2020; Ehrlich & Ross, 2015; Gélinas *et al.*, 2017; Gibson, 2006; Gibson *et al.*, 2016; McGregor, 2008; Noble, 2016; Reo *et al.*, 2017; Seaborn *et al.*, 1998; Stevenson, 1996; Usher, 2000; Vanclay, 2020), the Nuclear Waste Management Organization has adopted a participatory process with partnership as an outcome, recognizing that working at the community level and taking the lead from local indigenous knowledge holders is the only way to incorporate the nuances of the region (Arctic Council, 2015; Arnold & Hanna, 2017; Bond *et al.*, 2012; Booth & Skelton, 2011; Croal *et al.*, 2012; Curran & M'Gonigle, 1999; Eckert *et al.*, 2020; Gilchrist *et al.*, 2005; Hill *et al.*, 2020; Johnson *et al.*, 2016; Landsberg *et al.*, 2013; Mayhew & Perritt, 2020; Muir, 2018; Okediji, 2018; Reo *et al.*, 2017; Stevenson, 1996; Tengö *et al.*, 2017; The Nature Conservancy, 2017; Usher, 2000; Whyte *et al.*, 2016). Including historical, cultural, and spiritual interests that are embedded in the local context ensures we draw upon the best available knowledge to understand potential environmental effects, and their significance. This has often involved "experiencing" the land together, participating in ceremony, and co-creating studies focused on features of the biophysical environment of most value to those involved in the process (Arnold & Hanna, 2017; Johnson *et al.*, 2016; Landsberg *et al.*, 2013; Mayhew & Perritt, 2020; Perritt & Mayhew, 2019; Reo, 2011; Rosa & Sánchez, 2016; TBC, 2018; Tengö *et al.*, 2014, 2017). The understanding of potential effects and ways to apply the Mitigation Hierarchy (see Ekstrom *et al.*, 2015) are being enhanced by interweaving different knowledge systems, especially when knowledge gaps exist (Arctic Council, 2015; Johnson *et al.*, 2016; Tengö *et al.*, 2017; Usher, 2000). This diverse values approach emphasizes the shared desire to protect biodiversity and ecosystem services essential to many facets of well-being.

6.3.1.3 Incorporating diverse values in decision-making in agriculture

In this section we highlight the various policy options that attempt to incorporate diverse values of nature in the agriculture sector. Recognizing that agriculture could lead to unacceptable socio-ecological risks when guided by a narrow consideration of interests and values; (Lathuillière *et al.*, 2017) several policy options are being promoted including the following:

Swidden agriculture also described as "living landscapes" supporting land productivity, forest conservation, ecosystem services, and human well-being (Bruun *et al.*, 2009; Dressler *et al.*, 2017; Fox *et al.*, 2014; Li *et al.*, 2014), it is the primary source of sustenance for about 500 million of the poorest rural peoples in the humid tropical regions of Central Africa, Asia, and Latin America (Dove, 1983; Dressler *et al.*, 2017; Li *et al.*, 2014). Low capital input, a culture of reciprocated inter-household labour arrangements (Geschiere, 1995; Indra & Buchignani, 1997; Koczberski *et al.*, 2018; Vasco, 2014), and the farming of cash crops alongside food crops, have made swidden agriculture economically preferable (Dove, 1983; Li *et al.*, 2014; Rahman *et al.*, 2017).

These systems are managed based on culture specific indigenous knowledge about forest ecosystem functioning (Reyes-García *et al.*, 2008; Wangpakapattanawong *et al.*, 2010; Xu *et al.*, 2017), with crop diversity observed to be directly linked to cultural identity (Arévalo, 2008; Hume, 2006; Perreault, 2005; WinklerPrins & Barrera-Bassols, 2004) and key ecological benefits, and role in biodiversity conservation (van Vliet *et al.*, 2012). A global assessment points out the expansion of swidden systems in Central Africa and Latin America (van Vliet *et al.*, 2012), partly determined by input costs and insecure land titles. Swidden farmers also undertake intensification through e.g., hedgerow intercropping that increases yield and conserves soil (Aweto, 2013; Kang & Gutteridge, 1994).

Sustainable intensification in agriculture is a diverse values based agricultural system aiming to improve agricultural productivity and environmental management (Buckwell *et al.*, 2014; Elliot *et al.*, 2013; Garnett *et al.*, 2013; SDSN, 2013). For example, 75% of the land leased by National Trust in the United Kingdom to tenant farmers are part of environmental schemes that reward organic farming agriculture, nature conservation, and public access to biodiversity (especially wildlife) in the farm landscape (National Trust, 2009, 2018) and aligned with international climate, biodiversity and sustainable development obligations.

The food sovereignty movement advocates for government policies that decentralise food production among smallholder farmers around the world (Anderson, 2018; Patel, 2009). Food sovereignty advocates led by the global organization *La Via Campesina*, maintain that

the right to food, not the right to profit, should be the first consideration of food policy (CAADP, 2015; National Trust, 2009, 2018; Patel, 2009; Pretty *et al.*, 2011, 2018).

Supranational initiatives

The European Union post-2020 Common Agricultural Policy (CAP) subscribes to a diverse values ethos for the agricultural sector (EU, 2018, 2020b). The post-2020 Common Agricultural Policy discussion (EU, 2020a, 2020b) seeks to transition to sustainable agricultural intensification to support multiple objectives from viable farm income, food security, climate action, management of natural resources among others (Buckwell *et al.*, 2014; EU, 2019; Peer *et al.*, 2020) (see also EU, 2018; EU & Directorate-General for Agriculture and Rural Development, 2018).

A similar supranational initiative is the Africa growth corridor initiative launched at the United Nations General Assembly in 2008, and later becoming a key component of the 2014 African Union Malabo declaration on agriculture and postharvest losses (Byiers *et al.*, 2016; Kaarhus, 2018). It is guided by the comprehensive Africa agriculture development program framework that was endorsed in 2014 (AU & NEPAD, 2015; Kimenyi *et al.*, 2013). These are supported by national governments (e.g., Tanzania, Mozambique) and several international organizations and business interests including the African Union, the African Development Bank, the World Economic Forum, the New Alliance for Food Security and Nutrition, and Grow Africa (CAADP, 2015; Gálvez Nogales, 2014). However, their success would be limited by corruption and weak laws with deleterious effects on nature and human wellbeing (Brüntrup, 2011; Byiers *et al.*, 2016; Cooksey, 2013; Kaarhus, 2018; Laurance *et al.*, 2015).

Linking Environment and Farming (LEAF) certification system

Created in 1991 in the United Kingdom to promote sustainable agriculture; by 2003 and with the support of farmers and food retail chains like Waitrose, the Linking Environment and Farming Marque sustainable agriculture certification system was set up allowing certified members to label their products with the Linking Environment and Farming Marque logo (LEAF, 2018). The certification assesses multiple social and ecological dimensions e.g., soil management, crop health, pollution control, animal husbandry, energy efficiency, water management, landscape and nature conservation, community engagement, and organisation and planning (LEAF, 2020; Oberč & Arroyo Schnell, 2020; Rose *et al.*, 2019). Presently, 43% of fruit and vegetables in the United Kingdom were produced on Linking Environment and Farming certified farms; these certified farms are now present in 27 countries across Africa, Asia, Australia, Europe, North and South America (ITC, 2011; LEAF, 2020). Complying with Linking Environment and Farming criteria is linked to financial payments farmers receive from national governments in the United Kingdom and European Union (DEFRA, 2018; EU, 2017; Hjerp *et al.*, 2012; Reed *et al.*, 2017).

In order to meet SDG 2 (zero hunger by 2030), with the other SDGs, there is a need for a multi-dimensional transformative agricultural approach that is responsive to ecological and social risks associated with food production (BSDC & AlphaBeta, 2016; Byiers *et al.*, 2016; Dobermann, 2016; LEAF, 2020; SDSN, 2013). Sustainable agriculture practices are a response to this need for transformative change in food production (Oberč & Arroyo Schnell, 2020; van Vliet *et al.*, 2012; Vía Campesina, 2017). Such initiatives share the attribute of being responsive to societal concerns that food production has to be guided not just by financial interests but by a diverse set of values including environmental and socio-cultural ethics (EU, 2019; Pretty *et al.*, 2018).

While similar approaches including the United States Agency for International Development (USAID) Feed the Future initiative working in Africa, Asia, and South America (Feed the Future, 2020); the Inter-American Institute for Cooperation on Agriculture (IICA) (IICA, 2018, 2019); and the Food and Agriculture Organization (FAO) global Farmer Field School (FFS) initiative (FAO, 2016) are pushing this diverse set of values agenda in policy formulation (Cairney, 2012), the challenges of legitimacy and implementation remain. This calls for partnerships involving government, civil society and business (Dobermann, 2016).

6.3.1.4 Incorporating diverse values in decision-making in protection of nature

The establishment of protected areas, effectively isolates and delimits these areas and species of fauna and flora from human impact in areas that surround it (Brockington *et al.*, 2006; Swallow *et al.*, 2009), often leading to displacement of local populations (Cernea & Schmidt-Soltau, 2006), with resultant negative consequences to their economic, cultural and social wellbeing (Brockington & Wilkie, 2015; Naidoo *et al.*, 2019).

In the past, protected areas were often created on lands that were worth protecting for their ecological and intrinsic values for society, without considering for instance more instrumental or cultural and spiritual values. Yet, local and indigenous people were, and still are, important resource managers and stewards of biodiversity who are embedded in these complex and adaptive socio-ecological systems (Berkes, 2008; Iwamura *et al.*, 2016; von Heland & Folke, 2014). Displacing indigenous peoples and local communities not only violates international law and exacerbates historical and contemporary injustices but may also have negative ecological consequences. One example of this is the loss of aboriginal fire management in Australia that led to

more devastating fires that increased in size and severity, threatening biodiversity and increasing greenhouse gas emissions from wildfires (Bowman *et al.*, 2013; Trauernicht *et al.*, 2015).

Current protected areas management issues and indigenous peoples

Currently, about one quarter of the world's land area is under indigenous peoples use or management rights (Garnett *et al.*, 2018; Tauli-Corpuz *et al.*, 2020). These indigenous and community conserved areas and territories are managed differently and in pursuit of diverse outcomes, but they are consistent with biodiversity conservation, resulting in indigenous conservation areas as being places of high cultural and conservation values (Aswani *et al.*, 2018; Berkes, 2008; Blackman *et al.*, 2017; Carson *et al.*, 2018; Garnett *et al.*, 2018; Paneque-Gálvez *et al.*, 2018; Reichel-Dolmatoff, 1976; Tauli-Corpuz *et al.*, 2020; van Vliet *et al.*, 2018). Examples of indigenous and community conserved areas and territories can be found on all continents, including customary rules protecting sacred forests in Madagascar, the customary practices of the Inuit of Nunavut to respect and protect important caribou calving grounds, and community conserved seascapes in Japan where fisheries are regulated under locally agreed rules (see Borrini-Feyerabend *et al.*, 2012).

Other effective area-based conservation measures (OECMs) are a more recent conservation designation for areas that achieve effective *in situ* conservation of biodiversity outside of protected areas with associated ecosystem functions and services, and cultural, spiritual, socio–economic, and other locally relevant values (CBD, 2018). Such areas can be managed for many different objectives where conservation can be a primary or secondary objective or may simply be the ancillary result of management activities. However, other effective area-based conservation measures must deliver effective in-situ conservation of biodiversity, regardless of their objectives (IUCN WCPA Task Force on OECMs, 2019). In the past years the number of other effective area-based conservation measures have been steadily increasing, adding to the global coverage of protected areas (ProtectedPlanet, 2020).

Moving beyond the narrow ideas of conservation and protected areas

The diverse strategies indigenous people and local communities use to manage territories represents the plurality of values people hold for nature. For instance, conservation and the managed use of resources, including wildlife, are not contradictory, but part of the same idea of land stewardship to ensure healthy lands and abundant species populations, which can also be described as *'caring for country'* using an aboriginal Australian term (Gorman & Vemuri, 2012) and respectful use and consumption of wildlife as an inherent duty (Krause *et al.*, 2020), marked by a system of reciprocity with the ecosystem (Sirén, 2012) (Annex 6.3).

Working with local people is increasingly realized as central for effective and equitable conservation (Oldekop *et al.*, 2016). This, however, requires a gender and livelihood perspective, since women and men not only hold different traditional ecological knowledges, but their use and management of natural resources varies depending on local context and cultural factors, (Aswani *et al.*, 2018; Stiem & Krause, 2016).

6.3.2 Policy options across sectors for transformative change

Achieving SDGs and transformative governance requires a policy integration that bridges and integrates across different values across multiple sectors. A few dominant cross-sectoral themes have been assessed including health, education, economy and how diverse values are embedded in policy options within them.

6.3.2.1 Policy options to include diverse values of nature in health

Health is a multidimensional aspect that is both an input to and an outcome of good quality of life. Achieving good health entails ensuring adequate nutrition, food security, mental and physical well-being and social interactions. This multidimensional nature of health has been well recognized in policy forums such as the World Health Organization, the Convention on Biological Diversity; and further, also at the level of local communities as seen in their practices and notions of health (Payyappallimana & Subramanian, 2015). National policy objectives generally tend to take a narrower approach to implementing health goals and have tended to focus more on developing medical care facilities with less emphasis on public health issues, social and environmental determinants of health (Settele *et al.*, 2020).At the same time, there are calls being made to foster self-reliance in health and bring in more pluralistic interventions that allow integration of multiple knowledge systems in ensuring health and well-being of individuals and societies (Mathpati *et al.*, 2020). Some pluralistic health approaches that are gaining attention include:

Approaches promoting human-nature interactions

More recently, the environment sector has been raising the need to mainstream biodiversity and environment issues into health sector planning and implementation (WHO & CBD, 2015). With the global burden of disease shifting towards non-communicable diseases, policies related to tackling air and water pollution, improving dietary diversity and nutrition, *promoting active lifestyles* especially in urban centres (through

promotion of parks and green spaces) have gained strategic importance within the health sector (WHO, 2018). Singapore is fashioning itself as a city in nature and has invested in promoting research to understand biophilic interactions of people including the well-being effects of different types of nature interactions (such as, nature parks, green spaces, therapeutic gardens for the elderly, play gardens for children) on people (National Parks Singapore, 2020). *The human urban microbiome initiative* is another initiative that aims to improve the health of populations in urban contexts. Identifying the necessity for people to interact with nature for better health, the initiative is urging cities around the world to develop green spaces and encourage people to spend time in closer contact with natural resources (Mills *et al.*, 2019).

Building on the concept of planetary boundaries (Rockström *et al.*, 2009), the concept of *"planetary health"* emphasizes the interconnectedness of various social and natural processes, and further that anthropogenic factors have led to large scale degradation of nature and thereby benefits from nature (clean air, water, biogeochemical processes, amongst others) (Whitmee *et al.*, 2015). To address the challenges to these "natural life support systems" and human cross-disciplinary, multi stakeholder approaches are being promoted.

Whilst clearly acknowledging the importance of the interlinkages between the environment and health, a sense of urgency to take this nexus seriously across planning and implementation activities has arisen due to the COVID-19 outbreak (Settele *et al.*, 2020). EcoHealth approaches are considered more transdisciplinary as it relates to addressing human health issues by tackling the various determining factors- social, environmental and other epidemiological. It emphasizes the need for cross-sectoral implementation focusing on the linkages between ecosystem health, human health and social justice. This requires a close interaction between different types of experts triangulating observations with affected populations and identifying appropriate solutions (SCBD, 2020).

One Health is being promoted jointly through the One Health Commission by the World Health Organization, Food and Agriculture Organization and the World Organization for Animal Health that seeks to attain "optimal health" of humans, animals and the environment (FAO *et al.*, 2019). Its mandate is therefore wider in scope and is seen to be reflected more in country policies, with rise in frequency and severity of zoonotic and emerging infectious diseases (Cunningham *et al.*, 2017; Jones *et al.*, 2008; Lajaunie *et al.*, 2015). The Convention on Biological Diversity has adopted comprehensive guidance to integrate biodiversity considerations in One Health approaches to further widen the mandate of this approach beyond just infectious diseases, and to also deepen the links between biodiversity and ecosystems in achieving One Health objectives (SCBD, 2020).

For example, The Natural Livestock Foundation is coordinating an action research program to address antibiotic residue in milk in the Netherlands. Towards this, a team of modern veterinarians in the Netherlands interact actively with modern and traditional veterinarians from India, Uganda and Ethiopia to identify safer alternatives to treat cattle, that involve sustainable use of herbal medicinal resources and ensure ecosystem integrity (Groot & van't Hooft, 2016). The partnership and approach are illustrative of transformative solutions in production processes that build on deliberative and transdisciplinary approaches towards ensuring the well-being of humans, animals and the environment.

Community/indigenous health

This concept focuses on the health of local communities and marginalized populations, including indigenous people that relates not just to medical services, but involves access to food and nutritional security, cultural resources, medicinal resources, areas of cultural importance, rights to use and practice and livelihood security. It therefore translates to a sense of well-being that encompasses equity, development and ecological sustainability. Loss of or degeneration of any social, cultural or environmental resource due to various factors (from political, economic and others) has been seen to negatively impact the well-being indicators of such communities (King *et al.*, 2009; Montenegro & Stephens, 2006; Unnikrishnan & Suneetha, 2012). Examples of initiatives that seek to revitalize indigenous health traditions and promote endogenously led health care (Bawa *et al.*, 2020; Laycock *et al.*, 2011; Shankar *et al.*, 2007), also identify issues of lack of human resources to bridge between different disciplines, financial resource inadequacies and insufficient understanding and capacities of different implementing agencies.

6.3.2.2 Policy options to include diverse values of nature in education

There is a broad international consensus that education is a key enabler for change towards sustainability. Education, in its original sense of the word, is intentionally transformative, as it comes from the Latin word *ēdūcere*—to lead forth. However, education has also played a role in reproducing unequal and unjust social and economic relationships. It has been noted that the English word education has two different Latin roots: *educāre*, which means *'to train or to mold'* with an emphasis on the passing down of knowledge to youth, and *ēdūcere*, which stresses preparing youth to create solutions to emerging problems (Bass & Good, 2004; Craft, 1984). The ēdūcere dimension has been championed as critical for educational and broader societal transformation. In particular, an overall call for *'a shift from "transmissive" expert-based teaching and l*earning to transformative, community-based learning' (Capra, 2007) resonates with literature on "social learning" for sustainability (Keen *et al.*, 2005; Wals, 2007).

Many global and thematic indicators are narrowly focusing on schooling. Indicators for SDG 4 in general have also been criticized as prioritizing the "business as usual" in education and the education-for-economic-growth paradigm with their reliance on international large-scale assessments (especially literacy and numeracy proficiency data) as monitoring instruments (Komatsu *et al.*, 2019; Komatsu & Rappleye, 2018).

In the two policy options discussed below, the first focuses on the *educāre* (acquisition of knowledge and skills), and the second on *ēdūcere* ("social learning" and "transformative learning") dimension of education. The questions of how diverse values are included in education and how they contribute to transformative changes are also addressed in conjunction with these two broad policy options.

Formal education and competency-based approaches

As the wording and the global indicator of Sustainable Development Goal 4.7 clearly suggest, integration of *'knowledge and skills needed for sustainable development'* into school curricula is considered as a viable policy option, as basic understanding of environmental issues by voters, taxpayers and consumers are hypothesized to create crucial incentives for governments and private-sector actors to adopt environmentally-responsible behaviour (PISA-OECD, 2009). In an assessment of science competencies of 15-year-olds across 57 countries by the Organisation for Economic Co-operation and Development (OECD), students expressed that they learnt about environmental issues primarily from schools and only though subjects such as geography and science (PISA-OECD, 2009).

However, such international large-scale assessments could be viewed as reducing the quality of education to mere test scores and failing to capture the transformative aspirations of the SDGs. Furthermore, it has long been acknowledged that there is a gap between people's stated, prevalent concern for the environment and their largely unsustainable actions, lifestyles, and public policies (Glasser, 2007).

Transformative and social learning for sustainability

Exploration of learning processes which can trigger significant shifts in people's attitudes and practice has driven many researchers with critical as well as liberal progressive orientations over recent decades. Freire's theory and practice of "critical pedagogy" (critical awareness of social reality) formed the foundations of the "eco-pedagogy" movement which aims to foster human actions leading to social and environmental justice and planetary sustainability (Misiaszek, 2020).

The eco-pedagogy movement grew out of discussions at the 1992 Rio Summit and led to the launch of the Earth Charter in 2000. Chapter 36 of Agenda 21 (United Nations, 1992) is commonly considered as a foundational text of education for sustainable development which highlighted the critical role of education in realizing sustainable development (UNESCO, 2005, 2014a, 2014b, 2016, 2020; United Nations, 1992). Increasingly such calls are underpinned and reinforced by the need to achieve a paradigm shift in education—transformative shifts in educational practices, institutions, and policies required for understanding and enhancing individual and collective human well-being in profoundly different ways. Rethinking education as a global common good is even more relevant today, with new possibilities and potential threats brought about by digital technology (International Commission on the Futures of Education, 2020; UNESCO, 2015).

Apart from the Freirean, transformative education traditions and the international education for sustainable development movement culminated in the United Nations Decade of education for sustainable development (2005-2014) and is now enshrined in Sustainable Development Goal 4.7. Transformative learning as conceptualized by Mezirow (Mezirow, 1991, 1995, 2000) refers to altering already existing perspectives and implies continuity of worldviews, rather than a radical departure from and a disruption of existing norms (Taylor, 2015). In the "t-learning" project[10] under the transformations to sustainability programme of the International Science Council, the notion of "transgressive learning" was introduced to question and abandon norm foundations to explore radically different ways of being (Lotz-Sisitka, 2016; Lotz-Sisitka *et al.*, 2015; Macintyre, Chaves, Verschoor, *et al.*, 2017; Macintyre *et al.*, 2018).

Another related concept which is critical in considering the *ēdūcere* dimension of education for sustainability is that of "social learning". Social learning has developed as a new field of theoretical development and practical application in socio-ecological management and governance (socio-ecological systems, collective governance and management theory) and learning theory (Cundill *et al.*, 2014). In the field of natural resource management (Cundill & Rodela, 2012), the interest in social learning emerged in the 1980s, partly due to failures of "command and control" management (Holling & Meffe, 1996). Keen *et al.* (2005, p. 4) have defined social learning as *'the collective action and reflection that takes place amongst both individuals and groups when they work to improve the management of the interrelationships between social and ecological systems'.*

10. The t-learning project produced nine national case studies, including Sweden, Malawi, Zimbabwe, Netherlands, India, Vietnam, Ethiopia, Colombia, and South Africa. See https://transgressivelearning.org/.

Box 6 3 Case study on capturing diverse values of nature in education from Northern Japan.

Tajiri Town, site of famous wild goose habitat site Kabukuri Marsh, took an innovative approach to community development. Under the leadership of the Japanese Association for Wild Geese Protection, a diverse array of local stakeholders – non-governmental organizations, farmers, local and national government authorities, researchers – came together to manage Kabukuri Marsh to maintain its ecological functions.

Overcoming the initial antagonisms between those who called for the protection of wild geese and rice farmers who viewed wild geese primarily as harmful rice-eating birds, Tajiri Town pursued preservation of biodiversity (in paddy fields) and sustainable agriculture. The figure shows how the conceptualization of rice fields not only as farmland but also as wetland and nesting grounds for wild birds gave birth to the innovation of "winter-flooded rice fields", which in turn led to the designation of Kabukuri Marsh and the adjacent rice fields as a Ramsar site in 2005. The case study describes processes of social learning for mutually respectful cooperation between "environmentalists from outside" (initially seen as fanatic bird lovers) and "local people" (who depended on rice farming) and presents a model case of promoting both environmental and economic agendas at the local level (Mochizuki, 2007; UNESCO, 2012).

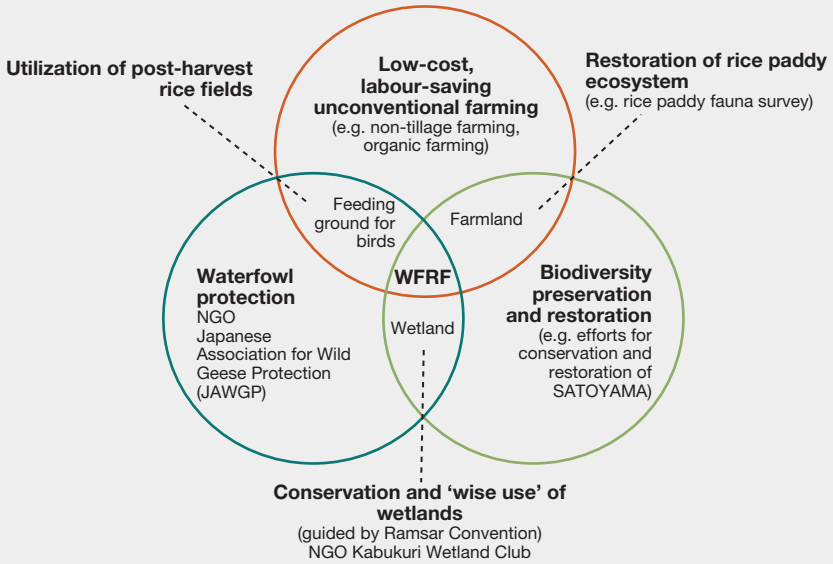


Figure 6 11 **Winter-Flooded Rice Fields (WFRF) as an innovation based on social learning in Kabukuri-numa and adjacent rice fields, designated as a Ramsar site at Ramsar COP 9 (the Ninth Conference of the Contracting Parties to the Convention on Wetlands of International Importance Especially as Waterfowl Habitat) in 2005.**

Source: Adopted from Mochizuki, 2007, p. 395.

6.3.2.3 Policy options to include diverse values of nature to economic paradigms

In this section, we identify key economic paradigms that seek to move economic systems towards sustainable pathways by incorporating values of nature along with other instrumental values.

Sustainable consumption and production

Moving away from promoting a high economic growth paradigm, Sustainable consumption and production is *'a holistic approach to minimising the negative environmental impacts from consumption and production systems while promoting quality of life for all'* (United Nations Environment Programme, 2015). It relies on the idea of decoupling economic growth from environmental degradation by

reducing material/energy intensity of and lowering emissions and waste from economic activities, by promoting a shift of consumption patterns towards groups of goods and services with lower energy and material intensity without compromising quality of life. It also promotes a life-cycle thinking throughout all stages of the production-consumption process.

Sustainable business model archetypes target sustainable consumption and production in four ways (Bocken *et al.*, 2014): (1) maximizing material and energy efficiency (do more with fewer resources, generating less waste, emissions and pollution); (2) creating value from *waste* (turning waste streams into useful and valuable input to other production and making better use of under-utilised capacity); (3) substituting non-renewable resources and current production systems with renewables and natural processes; (4) deliver functionality rather than ownership (provide services that satisfy users' needs without having to own physical products) (Annex 6.3 highlights specific tools and actions to support sustainable consumption and production).

Circular economy

The major aim of the circular economy concept is to decouple economic growth and the deterioration of the environment (Ghisellini *et al.*, 2016), suggesting that economic prosperity and improved environmental quality can be achieved together (Kirchherr *et al.*, 2017) through technological, economic and social innovations (de Jesus & Mendonça, 2017; Ellen MacArthur Foundation, 2013).

Definitions of circular economy regularly refer to the 3R or 4R or other extended Rs models (Kirchherr *et al.*, 2017), listing most frequently reduce, reuse, recycle and recover as the key functionalities within circular economy (Potting *et al.*, 2017; Reike *et al.*, 2018). Circular economy initiatives can be implemented by governmental bodies as well as by business actors and non-governmental organizations (Kalmykova *et al.*, 2018; Potting *et al.*, 2017) **(Table 6.6)**. While it is often encouraged and regulated at the national level, it is directly linked to global value chains and transnational waste dumping and trade, both characterized by power inequalities (Schröder *et al.*, 2019), implying also that a better integration of well-being and human rights in circular economy is important (Murray *et al.*, 2017).

The most recent circularity gap report concluded that the current degree of circularity in the global economy is currently lower than 9% (Cooper *et al.*, 2017; Haas *et al.*, 2015; PACE, 2020), possibly due to the large proportion of material throughput (Haas *et al.*, 2015), and accelerating production due to the rebound effect (Zink & Geyer, 2017). Barriers and challenges of circular economy are extensively discussed in the literature, pinpointing both "soft" (social, regulatory and institutional) and "hard" (technological solutions and financial factors) limiting factors as well as opportunities to overcome the barriers (de Jesus & Mendonça, 2017; Ranta *et al.*, 2018) (Annex 6.3).

In current practice circular economy is mostly contextualized within a utilitarian approach and embedded in the green growth paradigm where circular creation of economic

Table 6 6 **Examples of circular economy implementation.**

Country	Law / Policy	Approach	Reference
China	• Circular Economy Promotion Law (2009)	Aims for green and sustainable growth of the economy	Su et al., 2013 Yuan et al., 2006
Japan	• Eco-town program • Forum of Global Multi-Value Circulation including companies, universities and research institutes	Eco-industrial (urban and industrial symbiosis) parks at meso level Promote bottom-up approaches	Ohnishi et al., 2012 Van Berkel et al., 2009 Halada, 2020
EU	• Waste Framework Directive, 2008 • Circular Economy Package • New Circular Economy Action Plan (2020)	Regulating both production and waste management	- Hughes, 2017 -
USA	• State level and sector specific regulations exist but no federal regulation	Promote bottom-up approaches	Ranta et al., 2017
Australia	• Cross-sectoral initiatives	The Circular Economy Australia and the Sustainable Business Network has been working on a circular economy agenda	Ghisellini et al., 2016
Brazil	• Bottom-up initiatives	Women co-operatives, e.g., Rede Asta, created an online platform to support women artisans recovering material from urban and industrial waste	Geng et al., 2019
Mexico	• General Circular Economy Law	Under development	-

value is considered as a business opportunity (Buchmann-Duck & Beazley, 2020; Hopkinson *et al.*, 2020). Its potential to transform the economic system could be enabled by including intrinsic values of nature (Schröder *et al.*, 2019). Towards this, some policy instruments are already available which try to incorporate the intrinsic values of nature (e.g., tax and trading schemes for carbon or biodiversity). However, researchers opine that technological and socio-economic lock-ins and rebound effects can only be managed if institutional reforms consider planetary boundaries as well as social impacts in a wider sense (Schröder *et al.*, 2019). Embracing human-centric solutions to circular economy is possible if decoupling is accompanied with a transition away from mass-consumption combined with the inclusion of diverse actors and grassroot schemes (Clube & Tennant, 2020).

Degrowth

According to Kallis *et al.* (2012), a degrowth society is one that is focused on social justice and ecological sustainability focusing on social and environmental wellbeing parameters (see Chapter 5). Building on existing practices that are in line with the values of degrowth such as eco-communities, cooperatives, community currencies or urban gardening (e.g., Cattaneo & Gavaldà, 2010; Dittmer, 2013), alternative ways of understanding societal well-being and work are suggested, with concrete proposals such as alternatives to gross domestic product, work sharing and basic income (e.g., O'Neill, 2012). Degrowth avoids the epistemological split between the natural and the social worlds but examines them as parts of one whole. It seeks alliances with communities of different worldviews, from which it also obtains inspiration, via concepts such as *Buen vivir* (Gudynas, 2011) and Ubuntu (Ramose, 1999). In this sense, it could be understood within the IPBES' integrated approach to nature that aims at bridging different value dimensions associated with value pluralism (Pascual *et al.*, 2017).

The sustainable state economics and degrowth literatures converge, with minor differences, to a similar set of policies and institutions: from resource and CO_2 caps; extraction limits; new social security guarantees and work-sharing to green investments; cooperative property and cooperative firms (Kallis *et al.*, 2012).

Degrowth can be implemented by all means of instruments: e.g., laws that support sustainable consumption; economic instruments such as interest rates; non-governmental organizations, government, business, campaigns too, as well as supporting a steady state. Different approaches to economic restructuring include green tax reform, which is calculated on the use of energy and resources instead of income (IPBES, 2019a).

Ecofeminist perspectives and caring economy

The concept of the caring economy, closely related to that of a care economy, takes the externalization of care work from the market economy as a starting point, and calls for a redefinition, redistribution and revaluation of caring activities (Power, 2004; Wichterich, 2015). It is an economy which prioritises care for one another and the environment over economic growth (Dengler & Strunk, 2018). Hence, it calls for a new way of valuing ecological processes and the non-human environment (Biesecker & Hofmeister, 2010; Jochimsen & Knobloch, 1997).

Proposals for transitioning to a caring economy have multiplied especially in the face of the COVID-19 pandemic, as the importance of essential workers and care activities became visible (Stevano *et al.*, 2020). Simultaneously, the importance of care work has been highlighted in the context of Green New Deals (Bauhardt, 2014), and re-valuing care work is increasingly considered as playing a key role in climate policies and for climate justice (Barca, 2020; Di Chiro, 2015).

6.3.3 Competing interests need to be reconciled for transformative change

Reconciling between multiple interests at the international, regional and national level are being actively pursued to achieve sustainability goals. For instance, changes in climatic conditions have an overall negative impact on biological diversity. Whilst the regulatory regime needs to integrate mitigation and adaptation challenges into biodiversity conservation laws, it is not yet clear how biodiversity standards and safeguards can be effectively integrated in the climate regime, as evident from the Reducing Emissions from Deforestation and forest Degradation (REDD+) discussions (Panfil & Harvey, 2015). Further, while there is a growing recognition of the rights of indigenous peoples and local communities, the challenge now is to balance the competing social and environmental interests being mindful of power imbalances (Johnson *et al.*, 2016; Stevenson, 1996; Usher, 2000), epistemologies (Gilchrist *et al.*, 2005; Usher, 2000), contextual realities (Curran & M'Gonigle, 1999; McGregor, 2008; Muir, 2018; Whyte *et al.*, 2016), equity and cultural concerns (Arctic Council 2015; Stevenson, 1996; Usher, 2000). Good practices to integrate various worldviews and practices for better socio-ecological solutions (Curran & M'Gonigle, 1999; Johnson *et al.*, 2016; McGregor, 2008; Noble, 2016; Reo *et al.*, 2017; Reo & Ogden, 2018; Tengö *et al.*, 2017; Usher, 2000) need to be further mainstreamed. The evolution of policy options to adapt to growing socio-ecological tensions in and across sectors, if strengthened and promoted, could enable transformative changes towards sustainability.

6.4 IDENTIFIED GAPS AND THE ROLE OF CAPACITY DEVELOPMENT FOR OPERATIONALIZING THE DIVERSE VALUES OF NATURE

This section is focused on identifying knowledge and operationalization gaps throughout the assessment. Gaps are believed to hinder the incorporation of the values of nature into decisions. Therefore, the identification of gaps allows to highlight research needs within the topics covered in the assessment, and to identify the opportunities for fostering the integration of the diverse values of nature into decision-making processes aiming at transformative change. Assuming that capacity development is critical to shift power asymmetries, improve the outputs of negotiations, and realize more just and sustainable outcomes, gaps are presented as opportunities for capacity development. For that, a heuristic concept of capacity development is used. One in which the objective is to go beyond the transfer of information or training to the development of processes that generate context specific social learning. Processes that are respectful of different worldviews, values, and knowledge systems, and in which diverse actors can learn to act collectively to bring about transformative change towards just and sustainable futures. As such, capacity development is considered an inherently complex and evolving learning process.

6.4.1 Conceptualizing knowledge and operationalization gaps

Gaps throughout the assessment were identified as knowledge and operationalization gaps. Knowledge gaps refer to shortages of information found throughout the assessment that limit the evidence needed to answer the questions posed across the assessment. Operationalization gaps refer to all aspects throughout the assessment that were identified as undermining the incorporation of diverse values in decision-making for transformative change towards just and sustainable futures. Other limitations that frame the assessment in general were pinpointed by Chapter 1. They refer to the overall shortcomings regarding the literature that was accessed and used (see 1.4.3) (Annex 1.6). The latter implies biases associated with the type of literature reviewed, the language it is written in, region of origin, topic of sources, and cross-regional work. These same biases are implied in the gap's analysis presented in this section.

Withing gap categorization, knowledge gaps were regarded to be pieces of knowledge or data that were absent or insufficient to fulfil the mandate of the assessment. They were categorized into (i) research gaps, referring to conceptual, relationship knowledge, and methodology gaps; and (ii) data gaps, referring to lack of information at specific spatial, temporal, taxonomic, functional, habitat, social sciences, economics, among other levels or scales. Operationalization gaps refer to all aspects throughout the assessment that were identified as undermining the incorporation of diverse values in decision-making for transformative change towards just and sustainable futures. The category includes: (i) Information gaps, which consider cases in which there is a lack of knowledge availability for mobilizing diverse values within valuations or for decision-making, (ii) resource gaps that refer to a lack of means for achieving stakeholder representation and conciliation, or for generating knowledge, or for pushing forward specific policies, and, (iii) capacity gaps, which relate to lack of skills, will, or guidance, at the institutional or individual levels, and that compromise operationalizing processes aiming at incorporating diverse values for supporting patterns for transformative governance.

6.4.2 Assessing knowledge and operationalization gaps: materials and methods

Knowledge and operationalisation gaps were compiled through a meta-analysis of gaps identified from all chapters of the values assessment[11]. First, a quantitative analysis was made in which all gaps were categorized and organized into clusters (clusters being groups of gaps addressing the same issue within knowledge and operationalization categories). Furthermore, all identified clusters were linked to one of the eight steps of the operationalization cycle: (i) clarify the purpose, (ii) recognize diverse values, (iii) understand the context, (iv) weigh up the trade-offs, (v) trace the decision chain, (vi) select policy options, (vii) find entry points, and (viii) reflect outcomes (see 6.5.3.3, **Figure 6.13**, **6.16**). The alignment of the clusters to the operationalization cycle revealed key steps in which gaps are more evident and where they are less frequently identified in available literature (see 6.4.3).

Also, a qualitative analysis was performed to all clusters of gaps identified within the assessment. The latter revealed emergent topics that are discussed as: (i) conceptualization of values, (ii) gaps linked to valuation, (iii) IPLC and ILK knowledge, (iv) policy uptake, (v) policy instruments, (vi) leverage points for transformation, (vii) values and futures, (viii) justice and power, and (ix) capacities needed to mainstream diverse values (see 6.4.4). Furthermore, capacity dimensions that have been described in detail in section 6.1.2.4, were considered entry points to address the assessment gaps and other challenges for the operationalization of values (see 6.4.5). With

11. Review of gaps within the chapters of the IPBES Values Assessment (https://doi.org/10.5281/zenodo.5899737).

that consideration, findings derived from the clustering of knowledge and operationalisation gaps led to an understanding of specific capacity development needs, which were linked to capacity dimensions **(Table 6.9)**.

6.4.3 Gaps in knowledge and operationalization: results

Understanding gaps within the assessment highlights a general picture about the types of gaps identified in the revised literature regarding values and valuation. The analysis across the assessment identified more knowledge than operationalization gaps (21 knowledge gap clusters as opposed to 18 operationalization ones; **Figure 6.12**), possibly due to inadequate reporting of operationalization gaps in academic literature.

Concerning the operationalization cycle, knowledge gaps addressed more than one step of the cycle. Up to 86% of knowledge gaps were associated with the recognition of values, 52% to understanding the context in which values become visible, less than 28% to knowledge associated with tracing the decisions chain and 33% to outcomes of decision-making. Operationalization gaps also covered more than one stage of the cycle- up to 89% related to the recognition of diverse values in decision-making; 61% to aspects linked to understanding the context and to tracing the decision-making chain; 33% to understanding outcomes of decision-making; almost 28% to our ability to weigh up

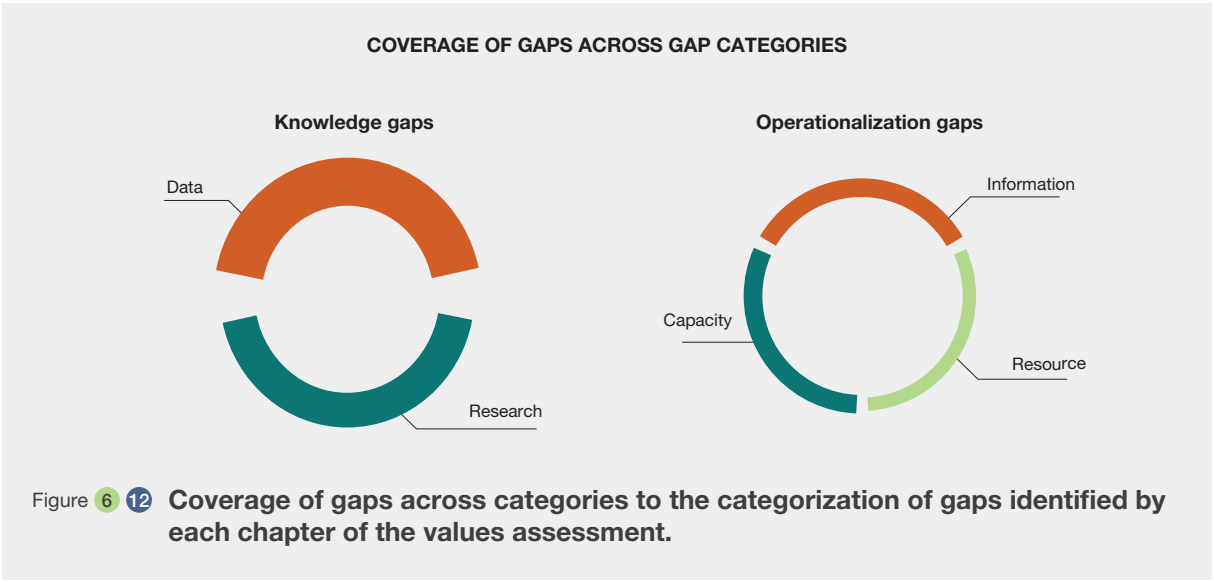


Figure 6 12 **Coverage of gaps across categories to the categorization of gaps identified by each chapter of the values assessment.**

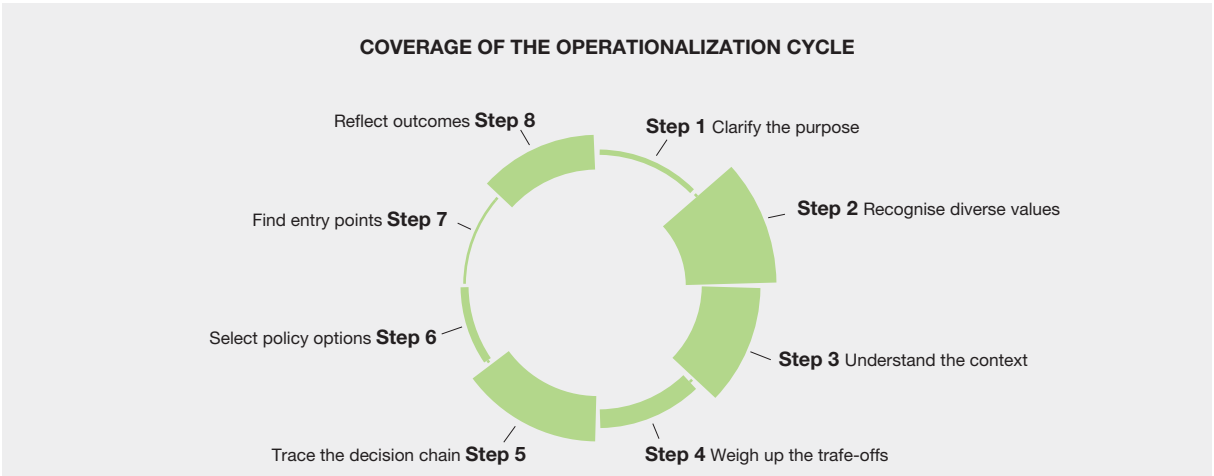


Figure 6 13 **Coverage of gaps (both knowledge and operationalization) according to the eight stages of the operationalization cycle, thicker lines indicate more gaps identified for that stage of the cycle (see also Figure 6.16).**

the trade-offs, and up to 17% related to gaps concerning selecting policy options. Only one of the categories was aligned both with clarifying the purpose of valuation and finding entry points (5.5% for each stage).

The analysis **(Figure 6.13)** reflects an understanding about important gaps in knowledge regarding ways to make diverse values visible and the role they play in multiple decision contexts, and along the decision chain across time and scales. However, there is less knowledge about operationalization gaps that tackle the rest of the operationalization cycle. The latter implies less understanding of the possibilities of how to establish clear purposes for decision-making and valuation; weigh up trade-offs in valuation and decision-making; select between multiple policy options; find entry points for values and valuation in a decision-making process; and reflect values on outcomes of a given decision. All of these are equally important aspects to bridge the gap between knowledge generation and operationalization of values in decision-making. A greater understanding of these gaps could allow us to address them and transform the way we make decisions regarding nature and its contributions to people.

6.4.4 Emergent topics identified through a qualitative analysis of gaps

This subsection presents a discussion of emergent topics that resulted from a qualitative analysis of the identified clusters of knowledge and operationalization gaps. Most of these issues relate to a lack or shortage of information or capacity for operationalizing diverse values into decision-making. The following lines provide a broad picture of these emergent topics in light of the present assessment.

6.4.4.1 Gaps regarding the conceptualization of values and their roles in decision-making

The grouping of most gaps identified throughout the assessment, both concerning knowledge and operationalization, indicate that they greatly stem from a lack of a broad conceptualization of values of nature. In general terms, experts within the assessment indicated that research regarding values of nature is generally limited and has not been expanded across contexts or scales or concerning the understanding and integration of IPLCs values and ILK systems. Even though there is an increasing trend for addressing the conceptualization of values of nature across diverse traditions (i.e., biophysical, economic, or other social sciences), interdisciplinary efforts are not common. Experts within the assessment from academic fields that address values of nature, also highlighted the need to conduct more research. For example, they point to the lack of biophysical valuation of some values of nature and their contributions to people, which result in their undermining within decision and policy making. Particularly, it is considered that in general, there is a deficiency of primary (e.g., field) data (spatial, temporal, scale related, taxonomic, functional, habitat) to be used for biophysical valuation of nature, especially over large areas. That is, there is a general lack of relevant knowledge in spatial terms (data unavailable across regions), in temporal terms (data un available for the required time span), in scale related terms (data is unavailable at the required scale or at a fine enough spatial resolution), in taxonomic terms (data unavailable for some taxonomic groups), in functional group terms (data un available for some functional groups), and in habitat terms (data unavailable for all required habitats). Particularly the Global South is considered to face a domestic deficit of research and funding sources for ecosystem assessment that affects conceptualising plural valuation. At the same time, much of the existent research is either not relevant or not accessible (i.e., not publicly available in open databases).

As the focus of research regarding the conceptualization of values and their contribution to people has mostly focused on material values, there is a lack of understanding of other values and how they can contribute to prosperous economies without requiring economic growth. Also, there is little knowledge about the implications of applying only instrumental indicators such as gross domestic product across regions (see Policy instruments section). This focus on instrumental values is also seen in the assessment of future archetypes, showing important gaps in the recognition of non-material, intrinsic and relational values (see 5.2.2.3.1). Moreover, there is scarce information to conceptualise about how values form and change over time and a lack of understanding of negative values of nature and the role they may have on individual and collective decisions.

Other issues that stand out regarding conceptualization of values of nature and their contributions to people refer to the lack of conceptual proficiency in practical applications that consider the risks of under- or over-emphasizing specific values. The current focus on values underpinning human actions (explicit or implicit) has created gaps in the understanding of relations between humans and nature which are at the centre of environmental decisions. This has often resulted in a lack of policy coherence with negative consequences for biodiversity and human well-being. Initiatives that seek to revitalize local values, in particular IPLCs values, are often not upscaled and face challenges such as lack of resources, insufficient understanding, or lack of capacities of implementing agencies (further explained below), which represent missed social opportunities for environmental policy implementation.

6.4.4.2 Gaps linked to valuation tools and methodologies

The recognition and use of methods for the valuation of the nature's diverse values is currently extensive and continues to be updated (see 3.1, 3.2). Most methods have been developed for measuring biophysical elements, that is, the structure, flow and supply of different values of nature/nature´s contributions to people. Methods have also advanced in providing economic/monetary valuations regarding both market and non-market values, and further, draw out instrumental and relational values, but only to the extent that they can be quantified.

However, literature on the inclusion of non-monetary valuation methods is scarce. Values of nature such as those related to non-use and cultural values of nature were often found to limit the application of plural and diverse valuation methods and approaches across regions and contexts. The valuation methods were grouped in four methods families for this assessment (see 3.2.2) and across all of them, limited evidence was found regarding challenges, issues, and gaps associated with nature-based valuation. Gaps also relate to the application of valuation approaches that address behaviour based values.

Significant gaps were also identified regarding valuation methods and approaches applied within and by IPLCs and eliciting their values. There is a noticeable absence of literature that explores the history of valuation methods and approaches in IPLCs contexts as well as a lack of documented understanding and use of ILK. The latter excludes other valuation methodologies that are not mainstream but that are key in terms of expressing or representing diverse values (see 6.4.3.3). The focus on biophysical valuation of ecosystem services as well as monetary valuation approaches, leaves important gaps in the participation of local people in assessing and monitoring biophysical valuation which in turn may affect the quality of the available information and the legitimacy of local decision-making.

Deliberative methods falling in the behaviour-based family and which have often been suggested to improve participation of stakeholders in valuation and decision-making also show gaps in the inclusion of deeper psychological values that people attach to nature in different temporal, spatial, and social contexts. Integration methods also highlight difficulties linking models built with different objectives, computer languages, data requirements, or incompatible parameters. For example, scenarios and models, that have the potential to address distributional justice, have usually underrepresented IPLCs values and views for transformation. Few scenarios account for winners and losers yet, those recorded show powerful actors are associated with higher impacts on nature/nature´s contributions to people and quality of life, that are associated with materialism and individualism.

Valuation methods also show operationalization gaps. For example, there is a lack of information about the knowledge and values held by local stakeholders in decision-making and about the extent to which explicit valuation methods representing them determine the effectiveness, efficiency and social equity of project and policy outcomes. There is limited knowledge and application of approaches that allow reflecting values of futures that consider the participation of IPLCs or the impacts on ILK, more on gaps on IPLC is presented below in Section 6.4.3.3.

There is a divergence between the procedures recommended in academic literature and those applied by practitioners. Many valuation methods lack detailed empirical evidence on implementation and uptake of environmental policies. The fact that few integrated models have been applied widely in different settings may imply a lack of comparability of their performance. In general, there is a lack of tools mainstreamed to end-users needs, and although applications of integrated models and policy instruments in the United States and Europe are increasingly being considered (e.g., meta-analysis, integrated modelling tools, Bayesian belief networks, etc.), developing-country applications often rely on unit-value and other simpler approaches that tend to be less accurate when supporting decisions regarding nature.

6.4.4.3 Gaps linked to values of and valuation with IPLCs and ILK

There is a lack of comprehension of the similarities and differences between cultures regarding their interpretation of nature, human nature-relationships and the values that emerge within them. Furthermore, there is a limited recognition of diverse knowledge systems in many countries that contributes to neglecting the use of diverse languages, history, knowledge and lived experiences of IPLCs. Although there is the recognition and understanding of the need to go beyond inter- and trans-disciplinary frameworks and adopt cross-cultural frameworks, academic disciplines still lack a better understanding on how to recognize and integrate ILK systems in values and valuation research. These gaps seem more prominent in regions such as Eastern Europe or Africa. There is also a lack of a better understanding of how policymakers can open the space for IPLCs direct participation in shaping value assessments for decision-making processes.

The gaps identified by the assessment in the understanding of valuation methods and approaches applied by and within IPLCs can relate to multiple factors. For example, limited knowledge and understanding of the concept of "nature valuation" among indigenous and local scholars

and academics. It implies a lack of documentation on these aspects. Also, the guarded nature of ILK, particularly when it relates to ancient ways, limits its accessibility. Differences in documenting processes and ILK is not always based on written tradition, and therefore it is difficult to access and might not always be available for non-indigenous scholars to study, unpackage and characterize. There are also language barriers, an absence of ILK databases and difficulties associated with the validation of the evidence (both from an academic perspective and from the perspective of ILK holders). Most available information covers territories where academic systems include indigenous scholarship (i.e., New Zealand, United States of America, Canada). Therefore, even if there is a growing number of cases documented, the rich diversity of biocultural resources remains scarce. Methods and practices often require specific skills and knowledge that are known and shared only among those entrusted to hold and guard it. Thus, indigenous and local scholars are among those best positioned to advance the study of valuation conducted in and by IPLCs.

There is also evidence that sometimes there is a misconception amongst scholars that the inclusion of ILK in assessments of nature/ nature´s contributions to people means informing or educating indigenous people about western scientific aspects. However, successful inclusion of indigenous perspectives entails acknowledging and addressing knowledge and operationalization gaps between western scientists and indigenous knowledge holders to understand, accept, respect diverse worldviews, ways of understanding and implications for decisions regarding nature. Large gaps exist regarding the understanding of valuation methods and approaches used by IPLCs. There are also gaps in the ability to validate knowledge developed by IPLCs scholars, as well as scant skills and resources to implement multiple value assessment processes that consider different knowledge systems and to properly articulate values based on ILK in decision-making and policymaking and within local and indigenous territories. The structural capacities to acknowledge self-governance and autonomy of indigenous peoples and local communities to decide on their territories is another major gap that needs to be addressed to empower stake- and right-holders and allow them to articulate their values in their own terms. Overall, there is much to be learned from IPLCs, urging for the need to increase the visibility and work with knowledge holders, indigenous scholars, etc. They hold the key to vital knowledge, and more importantly, sovereignty over their knowledge (see 3.2.4) (Chilisa, 2017).

6.4.4.4 Gaps regarding the policy uptake of valuation

Even though valuation has often been identified as a key element to support decisions across scales, there is a lack of research on the practice of non-research and non-governmental organizations commissioning valuation consultancies on nature/nature´s contributions to people and their degree of uptake to inform decisions, as well as a lack of systematic knowledge on uptake of explicit valuation in national and local policy, particularly in non-English languages. Also, there is scant research on the barriers to uptake of explicit valuation outputs in policy cycles, related to the role of power brokerage for valuation knowledge. As a result, there has been a limited role of values in policy which has resulted in negative consequences for the environment and human well-being. Gaps on valuation uptake in decision-making, however, do not necessarily reflect limited uptake, as some valuations occurring in decision-making are not reported in academic literature.

There is little documented knowledge about how choices of decisionmakers are made and the values that are prioritized over others while making those decisions. The understanding of how decisions are made also shows gaps related to the length of decision-making processes, the resources available for decisions (e.g., size of budgets, personnel), and about monitoring results to assess the effectiveness of the implementation of decisions.

To access this type of knowledge, reviews of case studies were conducted across the assessment showing how decision-makers in developed countries have made deliberate choices to adopt multilateral environmental agreements because the governance context enabled actors such as non-governmental organizations to use valuations to contest and/or influence decision-makers. Nonetheless, these reviews also show that it depends on institutional capacity and influencers to be able to implement or use multiple valuation methods in decision-making. The case studies also show that in developing countries, monetary valuations have been necessary but not adequate to influence decisions of the private sector and policymakers. Non-monetary valuation that focused on cultural and existential threats was deemed important and missing.

Furthermore, there is a lack of understanding of the processes and methods that allow comprehending and considering the diverse values underpinning the global economic agenda, which is embedded in policies and policy instruments. Many policies at the global level are focused on one type of intrinsic biophysical value or instrumental values. For example, in the agricultural sector, we have limited understanding and awareness of environmental policy integration dynamics, processes and methods which has led to a limited incorporation of the values that underpin swidden agricultural systems in agenda setting. It would be helpful to also promote policies and instruments integrating other intrinsic biophysical values such as water cycle, water regulation as well as relational sociocultural values and instrumental economic and non-economic values.

Potential constraints for the uptake of valuation methods portraying a plurality of values can be related to methods' reliability, transparency, and valuation costs, that limit the adoption of multiple valuation systems in decision-making. Also, there are data gaps on how values from formal valuation methods align with the implicit values embedded in decision-making processes to explain why increasing valuation is not matching the adoption for informative, decisive or technical supportive purposes. Furthermore, effective coordination between stakeholders involved in decision-making processes is lacking, as well as multi-jurisdictional collaboration between stakeholders across scales. As a result of the latter, lack of coherence can be detected, both within and between final policy design/implementation and the respective values held by decision-makers and stakeholders. Addressing capacities, and in particular social network capacities, could help address these issues (see 6.4.4).

The assessment also identified limited available information regarding the uptake of valuation in the private sector, especially regarding corporate biodiversity impacts (e.g., the nature risk index parallel to climate risk). Addressing these gaps could allow data providers and investors to systematically track biodiversity disclosure, and accordingly build biodiversity information to improve decision-making impacting nature/nature´s contributions to people.

6.4.4.5 Gaps in the availability of policy tools and instruments that account for the diverse values of nature

Even though the assessment has highlighted the important role of accounting for diverse values of nature in policy tools and instruments, a large gap exists between progressive policies at the international level and limited success of the application of policy tools and instruments at the national level. Simultaneously, diverse autonomous initiatives that take place at the local level, mostly led by IPLCs that allow the integration of diverse values in decision-making, are still lacking recognition from provincial and central governments across the globe. Examples of these relate to experiential learning, Mother Earth teachings, land pedagogy, and land-based education. These play important roles in the revitalization of cultures, knowledge, language and identities.

Furthermore, at the implementation level, there is a lack of repositories or databases of best practice in plural valuation, particularly relevant to local decision-making. This makes it difficult to conduct appropriate systematic reviews of the representation of diverse values in public decision-making. Furthermore, this makes it difficult for decision-makers to access potential policy options to improve policymaking.

Despite the increased diversity of values incorporated into policies that support nature´s contributions to people and biodiversity conservation, the effectiveness, efficiency, impact and equity outcomes of those instruments have not been fully assessed (e.g., environmental education, protected areas, indigenous territories, land acquisitions for conservation, payments for ecosystem services, reducing emissions from deforestation and forest degradation, certification schemes for environmentally friendly production, etc.). There is also a gap in knowledge on the effectiveness, efficiency and equity outcomes of policy uptake of singular and/or diverse values aimed at balancing nature conservation and agriculture as well as policy uptake regarding ILK, such as legislation recognizing rights of nature, ecosystems, rivers, etc.

Looking at case studies and specific applications of policy instruments, the analysis highlights important gaps in the availability of funding to conduct plural valuation and adequate public consultation in Environmental Impact Assessments (EIA) or implement adequate Ecosystem Accounts. Gaps in this regard also include failures of how resources are allocated. Also, the assessment identified gaps in the understanding of off-site and long-term social and environmental impacts of protected areas and payments for ecosystem services (e.g., not only leakage, but also de-ruralisation, transformation of agriculture). Furthermore, policy documents and instruments such as national constitutions still show a limited incorporation of nature and its values as central elements of their configurations. These gaps limit the understanding of the long-term and large-scale impacts of policy instruments and their potential to promote or undermine broader transformation.

6.4.4.6 Gaps in the understanding of how values operate as leverage points for transformation

There is limited knowledge about how values of nature operate as leverage points for change. Main gaps for integrating values as leverage points lie in the ability to link interventions and provide feedback. Gaps also refer to the absence of studies assessing the decision outcomes and the impacts of the application of specific valuation methods. Studies focusing on impact evaluation rarely track the information, feeding into the evaluation of decisions causing the impacts (positive or negative).

Lacking research on how plural valuation and the consideration of diverse values may unlock transformative change has also limited understanding about the kind of sustainability aligned values that can lead to just and sustainable futures. In most methods that consider the role of human agency and intrinsic values in transformative adaptations there are gaps on the inner aspects that shape behavioural change, such as emotional, belief(s), mental at individual and social levels. Key gaps in knowledge

about how social factors (i.e., institutions, norms) influence individuals' and groups' values and behaviours have also been key to mapping leverage points for the enhanced application of diverse values.

Furthermore, there is a lack of understanding of the potential transformative role that policy instruments can have within different contexts. The contextual aspects that underlie the success and failure of the application of specific policy instruments that consider more or less diverse values are rarely discussed in literature.

6.4.4.7 Gaps in linked to values accounted for in futures research

Setting common goals amidst different actors is key for achieving just and sustainable futures (see Chapter 5). However, the assessment has shown that research focusing on futures has important gaps in the explicit integration of values of nature and in particular in qualitative studies that allow accounting for societal and cultural values in those futures. Future archetypes tend to focus on material and individual values leaving gaps in the representation of diverse values (intrinsic, instrumental and relational) particularly in those that are non-material.

There is a limited set of approaches to allow the reflection of values for futures that take into consideration the participation of local knowledge or the impacts of these futures on health or ILK. The role of studies that focus on the future is key to support transformations across scales. Nevertheless, the analysis reveals a lack of understanding about the role they can have to enhance diverse values of biodiversity in transformations across contexts (especially in urban transformations). There is a need for envisioned future systems to be more transparent, open, and collaborative, while dealing with both normative values and systemic issues.

6.4.4.8 Gaps in the values and valuation methods on the ability to address justice and power inequalities

There is a lack of knowledge about the relationship between social roles and power structures and their implications on the values that are expressed in decision-making. This gap goes beyond conceptual aspects and it extends into valuation methods and approaches and their role in their application to shape power structures and the multiple dimensions of justice. This gap is also related to the lack of knowledge, resources and capacities presented in previous sections which constrain the valuations, that shape equity in distribution and recognition of nature, limiting the development of scenarios towards just and sustainable futures.

In particular, there are gaps in scenarios of distributional justice and in transformative frameworks that reflect representational and power asymmetries, which are often limited by the underrepresentation of stakeholders' views on transformation, such as IPLCs. The lack of representation and participation of stakeholders in valuation and decision-making regarding nature has led to an unequal distribution of benefits from political, economic and technological developments, which often prioritize certain values (instrumental) over others.

There are also gaps in legal knowledge linked to the understanding of values and valuation and their uptake in policy, especially since justice is a central topic. Economies are embedded in legal settings, and laws and regulation are one of the most common and powerful ways to translate broad values and principles of large populations and restrict or direct the use, preservation and distribution of nature and its contributions. Despite this obvious importance, the knowledge held by legal academics and research groups within rights faculties working on the global commons and natural heritage and its legal implications is underrepresented in the values assessment and in the IPBES expert pools in general. This knowledge is of a conceptual nature, but a (different) type of legal expertise is indispensable to provide policy options or determine legal bottlenecks or opportunities in better representation of nature's values in decision-making.

6.4.4.9 Gaps linked to capacities

Currently, the role of values is very limited in policy and decision-making across scales much of these can be attributed to lack of capacities that different stakeholders and implementing agencies have to demand and provide adequate valuation exercises, revitalize diverse forms of knowledge and their associated values and upscale them into decision-making. In general terms, capacities are needed to ensure the availability of adequate institutional contexts that allow integrating values in decision-making.

Also, there are capacity gaps to bridge knowledge, in particular to integrate cultural and biological diversity strategies. Within academic arenas, there are communication and participation gaps between scientists from different disciplines and between science and practice. The representation of values and the conduction of valuation processes are often led by ad-hoc availability of expertise and limited by the challenges posed by the use of valuation outcomes in policy processes, leading to a limited use of combined disciplinary insights. Consequently, decision-making informed decisions considering values and valuation is often limited to disciplinary perspectives and limited views on values and have led to a lack of incorporation of diverse values in decision-making. Reduced social network capacities leading to lack of funding, limited motivational

capacity (i.e., political will), weak analytical capacities (i.e., skills, knowledge, tools) and deficient governance capacity (i.e., with entrenched power structures) have limited the evidence-based decision-making and in turn, inclusive decision-making process. Across governance levels, there is a need to mainstream diverse values into new forms of corporate and civil governance that could be improved by addressing the gaps in capacities across diverse stakeholders (see 6.4.4).

6.4.5 Capacity development for addressing gaps that hinder the operationalization of multiple values

Capacity development is one of the main levers that can lead to transformative change by tackling the underlying indirect drivers of nature deterioration (IPBES, 2019b). It can also become a means of addressing some of the above

Table 6 7 **Topical gap categories and potential of capacity dimensions to address them.**

Darker teal circles indicate larger opportunities of capacities to address the gaps.

Topics covering central gaps identified across the assessment	Capacity dimensions to address identified gaps					
	Motivational capacity	Analytical capacity	Bridging capacity	Negotiation capacity	Social network capacity	Governance capacity
Gaps about conceptualizing values of nature and its implications Value conceptualizations and data on diverse values in different social-ecological contexts, spatial and temporal scales, and knowledge systems. Representation of diverse values in decision making.	●	●	○	○	○	○
Gaps about the choice of valuation methods to support decision making Use of valuation to support specific decisions, including policy design. Documentation on how valuation methods influence policy outcomes.	●	●	○	○	○	○
Gaps about understanding the notion of 'value' and 'valuation within indigenous peoples and local communities Understanding diverse knowledge systems and lived experiences in values and valuation research. Articulating values in their own terms.	●	●	●	●	○	●
Gaps about uptake of values and valuation results in policy and decision Documentation of non-research organizations commissioning valuation and their uptake into decisions. Identification of barriers and enablers of valuation uptake into policy cycles. Identification of values prioritized by decision makers while making decisions about nature.	○	●	○	●	●	●
Gaps about facilitating policy tools and instruments to consider diverse values Repositories or databases of best-practice. Documentation of their effectiveness, efficiency, impact and equity outcomes. Long-term and large-scale impacts to block or promote transformation.	●	●	-	-	○	●
Gaps about understanding how values and valuation operate as leverage points for transformative change Role of valuation-informed decisions to unlock potential of institutions geared to transformative change across social-ecological contexts.	-	●	○	●	○	○
Gaps about the role of values in futures research Representation of diverse values in futures research. Role of futures research in promoting sustainability aligned values.	●	●	●	-	○	-
Gaps about the ability to address justice perspectives in valuation Role of power structures in value expression. Capacities and resources to address the three dimensions of justice (distribution, participation and recognition) through a values and valuation lens.	●	●	○	○	○	○

identified gaps. Capacity development goes beyond the traditional view of one-way, top-down knowledge transfer to that of knowledge generated as context-specific social learning processes. It involves different interested parties (stakeholders) who are situated at specific levels of decision-making (i.e., individual, organization, sector/network) and engage in processes for social learning, knowledge exchange, co-creation of knowledge and others alike (Barth, 2002; Brown, 2004; Lang *et al.*, 2012; Lotz-Sisitka *et al.*, 2015; Roux *et al.*, 2017; Wiek *et al.*, 2011). Emphasis is placed on reflection and learning for change, rather than on providing information (Freire, 2000). The latter entails turning information into knowledge through social relations and social contexts (Reyers *et al.*, 2018; Selomane *et al.*, 2019; Tengö *et al.*, 2014). Such a capacity development approach can address gaps regarding the use of values and valuation perspectives for decision-making, and can also address power asymmetries, trade-offs and conflicts that may arise due to different framings, perspectives, representations, interests and needs on human-nature relations and associated values (Reed *et al.*, 2014, 2018).

Capacity development can be described across six broad dimensions that have been described in detail in Section 6.1.2.4: motivational, analytical, bridging, negotiation, social networking and governance capacities (Gupta *et al.*, 2010; Kuhlicke *et al.*, 2011; Kuhlicke & Steinführer, 2015). Each of these dimensions can provide windows of opportunity for addressing gaps identified previously. A summary of the detailed analysis can be found in **Table 6.7**[12].

12. Review of gaps within the chapters of the IPBES Values Assessment (https://doi.org/10.5281/zenodo.5899737).

6.4.5.1 Stakeholders' capacity development needs

Based on expert knowledge, specific examples were collected where the lack of certain capacities negatively impacted the consideration of nature's diverse values in decisions. A questionnaire and a workshop were carried out with the author team of the values assessment, identifying 26 different cases where one or more capacity dimensions were considered insufficient. Within the 26 cases altogether 85 different capacity development needs were identified along the six capacity dimensions. Then each capacity development need was assessed in terms of how significant the need for the different stakeholders (on a scale of 1-5, where one referred to insignificant and five referred to highly significant capacity development need). **Figure 6.14** shows that the most frequently mentioned capacity development need relates to bridging capacities. Less cases revealed the need to develop social networking and motivational capacities, however, these two dimensions were scored the highest among all the others, highlighting how crucial their deficiency might be in certain situations.

Table 6.8 sums up the above results in a synthesised format, highlighting low, medium and high-level of capacity development needs for the different stakeholder groups along the different capacity dimensions. Please note that **Table 6.8** provides only a general overview. Even within the same stakeholder group there might be actors who have sufficient capacities and others who highly need capacity development for a given capacity dimension.

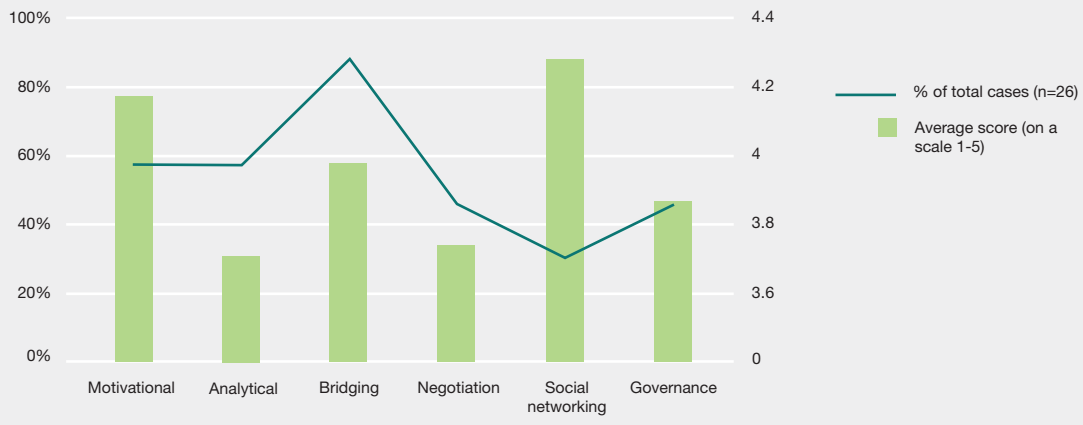
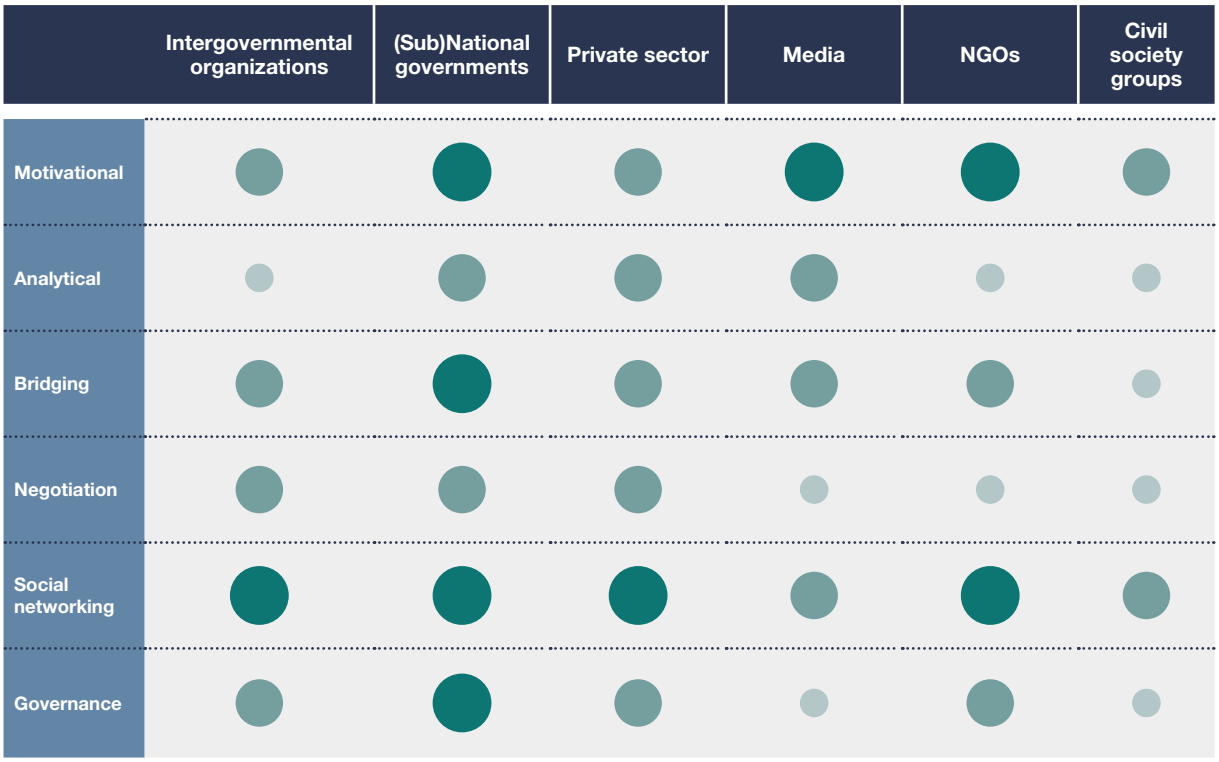


Figure 6 14 **The frequency and the significance of capacity development needs assessed through 26 expert-knowledge based cases.**

The left hand-side vertical axis shows the percentage of total cases where the specific type of capacity gaps was mentioned (blue line). The right hand-side vertical axis shows the average rating of capacity gaps across all the cases where the given capacity gap was mentioned (green bars). Mean values could vary from one (not relevant gap) to five (highly relevant gap).

Table 6 8 **Capacity development needs of the different key stakeholder groups.**

85 capacity needs grouped into the six categories were identified and ranked through a consultation process involving experts across the chapters of the values assessment. The larger the bubbles, the more capacity development needed.



To close this section, **Box 6.4** presents how the Philosophies of good living and their contributions to each capacity dimension, for example, can provide different perspectives for incorporating other values into decision-making for transformative change towards just and sustainable futures.

Box 6 4 **Philosophies of good living and capacity dimensions for incorporating other values into decision-making.**

Following the analysis of 204 academic publications[13] (Annex 1.6), we conducted a targeted review to exemplify how the "Philosophies of good living" and the nuances that emerge from them, contribute to the different capacity dimensions for making visible diverse values.

Philosophies of good living literature highlights how there may be other intrinsic motivations (as motivational capacity) to include values within decision-making processes that challenge dominant understandings of the concepts of welfare, common good, and development (Acosta, 2015; Herrera Acuña, 2016; Lalander, 2014; Munck & Wise, 2018). Values driving decision-making within such philosophies tend to have a more intrinsic and relational character than instrumental. Values for well-being include reciprocity between humans and with nature and communality placing at the centre the communal life rather than the individual (Acosta, 2015; Argumedo & Pimbert, 2010; Syse & Mueller, 2014). The way nature is conceptualized and valued at the core of these philosophies is rooted in biocentric attitudes. They support a more subjective quality of life and positive attitudes towards ecological protection, redistribution of wealth, the welfare state, food sovereignty and ecological diversity (Argumedo & Pimbert, 2010; Syse & Mueller, 2014). Examples of the values that drive motivations for decision-making are linked to an economic life where solidarity, love or sufficiency are at the core of social change and decisions (Argumedo & Pimbert, 2010; Bulloch, 2014; Godden, 2021; Herrera Acuña, 2016; Lee, 2014). Economic life may respond to market values, but subject to the service of society and not the individual (Acosta, 2015), focusing on a 'harmonious coexistence' between humans and nature recognizing principles of reciprocity, reciprocity, complementarity, interconnection and concordance among the

13. Literature review for the philosophies of good living ILK cross-assessment case study (cross-chapter/ILK) (https://doi.org/10.5281/zenodo.4399544).

various elements of life (Argumedo & Pimbert, 2010; Costanzo, 2017; Herrera Acuña, 2016; Hutchison & Sibanda, 2017; Munck & Wise, 2018; Noguera & Barreto, 2018). It also focuses on maintenance of good relations with others (Barranquero Carretero & Sáez Baeza, 2017; Herrera Acuña, 2016; Nielsen & Kimaro, 2019).

The facilitation of dialogue and learning processes *(bridging capacity)* and the abilities to develop collaborative relations and practices *(negotiating capacity)* are key to enable institutional contexts that allow such values to be represented in decision-making. In this respect, philosophies of good living show the important role of decolonizing perspectives to recognize other ways of seeing, knowing and doing (Gonzales & Husain, 2016), providing autonomy for innovation and integration of (often undermined) values immersed in those ways of thinking (Nielsen & Kimaro, 2019; Spencer, 2018), thereby enabling intercultural dialogues (Macintyre *et al.*, 2017) and intergenerational connectedness (Ullrich, 2019) that, reframes paths with a broader and all-encompassing human coexistence with the natural and material environment (Barranquero Carretero & Sáez Baeza, 2017).

The philosophies of good living can provide important knowledge and tools to analyse and reflect diverse values *(analytical capacity).* They target research outcomes framed in revalued concepts of progress and well-being (Gonzales & Husain, 2016; LaBoucane-Benson *et al.*, 2012) and seek to ensure the meaningful participation of indigenous and local communities in research "collaborators" (Yap & Yu, 2016). Indigenous research in Australia illustrates alternative ways of doing research to traditional research paradigms (White, 2010; Yap & Yu, 2016). These works point to their value not only in methodological terms (i.e., invoking indigenous knowledge and spirituality frameworks to dialogue with researchers through "deep listening") but also, to the ends themselves (i.e., empowering women; restoring indigenous communities, and enabling indigenous and local groups to be agents of their own development; White, 2010).

Furthermore, in terms of the capacity to learn, act, adapt and transform *(social network capacity)*, the Philosophies of good living link human-nature interconnections (Yap & Yu, 2016) to cultural identity (Prell *et al.*, 2009). The concept of *"Satoumi"* (from Japan), for example, which means improving seascape productivity through management, has been adopted in applied research for improving fisheries (Mizuta & Vlachopoulou, 2017). Networking capacity is also exemplified in support to forest management, increasing livelihood conditions, and integrating local values into decision-making (Jiusto & Hersh, 2009; Johnson *et al.*, 2018; LaBoucane-Benson *et al.*, 2012). Philosophies of good living can also provide insights on how to enable more equitable relations, for example, with reference to gender disparities (Herrera Acuña, 2016) and avoid exclusion of voices based on the notions of respect and coexistence (Barranquero Carretero & Sáez Baeza, 2017).

The creation of enabling and socially just governance environments *(governance capacity)* is key for the recognition of values emerging from philosophies of good living (see also Chapter 4). The importance of self-determination to strengthen governance and well-being (He & Xue, 2014), inform new political projects across different spheres, opposing hegemonic systems and neoliberalism (Syse & Mueller, 2014) is highlighted through respect for local production practices and management; tier knowledge systems as well as their expression within intercultural education systems; recognition of social, cultural and political rights of indigenous peoples and non-human components of nature; and providing access to information (Argueta, 2015; Giovannini, 2012).

6.5 OPERATIONALIZATION OF MULTIPLE VALUES FOR TRANSFORMATIVE CHANGE

The closing section of Chapter 6 focuses on the operationalization of pluralistic approaches, recognizing that integrating diverse values into decision-making and policies related to nature, nature's contributions to people and good quality of life constitutes a fundamental aspect of fostering transformative change for just and sustainable futures. It offers options for taking action to close gaps related to information, governance, capacities for the recognition and integration of diverse values into decision-making processes and associated policies and programs.

The section builds on the findings of the previous chapters of this assessment and subsections of this chapter, and draws on wider literature which focuses on practical implementation. The analysis aims to provide support on how to progress towards the Sustainable Development Goals (SDGs) across different contexts and stakeholders by the help of operationalizing the diverse values of nature in decisions. The first two subsections within 6.5 provide a framework to better understand and adapt to the context of valuation. Then an eight-step procedure is explained which, if followed, can help operationalize the values of nature in decisions. Section 6.5.4 highlights how the diverse values of nature can be operationalized through different policy support tools and policy instruments to achieve the Sustainable Development Goals. The section is closed with a list of potential values-centred action points, which provides option examples for different stakeholders.

Different epistemological frameworks and methodologies are considered that can contribute to overcoming monistic approaches, and thus have the potential to support transformation towards sustainability (Berghöfer *et al.*, 2016; Chan *et al.*, 2012; GIZ, 2011, 2018; Gupta *et al.*, 2010; Jacobs *et al.*, 2016; Laurans *et al.*, 2020; Max-Neef *et al.*, 1993; Reed *et al.*, 2014, 2017; Tengö *et al.*, 2014, 2017; UNDP, 2020; Wiek, Withycombe, Redman, *et al.*, 2011).

The IPBES Global Assessment clearly stated that *business as usual* approaches would only drive societies to more socio-ecological risks hampering progress towards the SDGs (IPBES, 2019a), thereby calling for a wider set of alternatives (Linnér & Wibeck, 2019). Alternative pathways for more just and sustainable futures exist at many different levels, across widely varying socio-cultural contexts, which includes different worldviews, knowledge and values systems, that many times are aligned with sustainability. It is vital to fully operationalize actions that enhance the integration of diverse values in decision-making, policies and practices (Laurans *et al.*, 2013; Reed *et al.*, 2017; Wyborn & Leith, 2018).

This inherently complex process requires many different types of capacities at individual, organizational and institutional levels to enable active systems of information exchange between and within networks (Reed *et al.*, 2014), which incorporate and integrate diverse knowledge systems (Tengö *et al.*, 2017), allowing synergies and fostering knowledge co-production (Wyborn & Leith, 2018). Such efforts should be understood as dynamic social processes of "knowledge brokerage": as a way of bridging boundaries by transforming concepts, principles, perspectives and knowledge into information that can be used and acted upon to influence decision-making in the real world (Reinecke, 2015; Rodela *et al.*, 2015).

In the context of diverse values, the process of knowledge brokerage, transformation and handover is multidimensional, and must take on several perspectives and stakeholders. When values are not shared widely or are not sufficiently inclusive, value framing tends to become a major arena of debate and contestation, hampering transformative change. To broaden value framing, decision-makers, policymakers, researchers, and other stakeholders need to be conscious about their values, worldviews, and the nature of their knowledge, acknowledging their strengths and weaknesses, and understanding the conceptual and policy implications (Ribot, 2017; Subramanian *et al.*, 2019).

6.5.1 Addressing gaps and challenges in different contexts

Considering diverse values in decision-making and policies requires the creation of, and support for, enabling contexts to improve participation, deliberation and negotiation between and within different stakeholders. This is possible, if differing interests, needs and values are considered, and conflicts and trade-offs are managed in a peaceful and constructive environment, where power differences can be addressed and balanced (Kothari, 2001; Leeuwis, 2000). As these framework conditions are usually not present, it is important to understand how different contexts can frame and shape valuation assessments and how they can encourage (or restrict) the recognition of diverse values in decision-making to support the design and implementation of appropriate policy measures that will have the desired impacts. Improving information as well as strengthening and developing different capacities at all levels of interventions is key to balancing power imbalances, improving the outputs of negotiations, and reaching more just and sustainable results (Chan *et al.*, 2012; Laurans *et al.*, 2020; Reed *et al.*, 2014; Zafra-Calvo *et al.*, 2017).

This subsection summarizes contextual characteristics and conditions that shape valuation and decision-making. Understanding the historically rooted social and political characteristics of specific contexts, which determine the

availability of the basic conditions for governability and capacities, can provide improved guidance for interventions at different stages to apply appropriate methods and approaches for the recognition of rights, diverse values and knowledge systems (Chan *et al.*, 2012; Natenzon *et al.*, 1986). If just and sustainable futures are to be pursued, but appropriate contextual characteristics are missing, more favourable conditions for pluralistic approaches need to be created and/or recreated. This can be considered as a process in itself, which implicates appropriate policy support tools as well as policy interventions (Chan *et al.*, 2012; Laurans *et al.*, 2020; Reed *et al.*, 2014).

To synthesise contextual characteristics, several different United Nations guides were consulted. The analytical framework of the United Nations Development Program Oslo Governance Center and United Nations Department of Economic and Social Affairs (UNDESA) (UNDP, 2020) recommends three key principles of stakeholder engagement when it assesses the quality of participation regarding the process agenda 2030: (i) *Inclusion:* covering non-discrimination and accessibility, (ii) *participation*, considering access to information and influence decision-making, and (iii) *accountability:* covering transparency on the engagement process and responsiveness. Each principle includes two dimensions that are highlighted across the 2030 Agenda for Sustainable Development and specifically reflected in SDG 16 – peace, justice and strong institutions. Based on this recommendation, as well as a broader literature review and the findings of previous subsections, we characterize the critical aspects of different contexts along two main analytical axes: institutional framework conditions and types of capacities.

Institutional framework conditions, related to types and forms of social interactions within different actors and stakeholders, include balance and/or imbalance of power through different formal and customary/traditional rules, norms and mechanisms that regulate the way people interact with each other (Crawford & Ostrom, 1995). The main elements include (i) the existence of participatory and power balance mechanisms (such as consultations); (ii) the existence of procedures and rules for accountability, transparency and responsiveness, (iii) the access to information and knowledge, (iv) the levels of collaboration and coordination between and within levels, (v) peaceful conflict resolution mechanisms, and (vi) the recognition and exercise of rights.

The different types of capacities include motivational, analytical, bridging, negotiation, social network and governance capacities (see more details in 6.1.3, 6.4.4).

Based on these institutional framework conditions and capacities, we differentiate four types of contexts: (i) Enabling; (ii) conducive; (iii) challenging; and (iv) contested/restrictive (**Figure 6.15**, Annex 6.4).

Enabling contexts arise from governance frameworks that offer the possibility for deliberation, co-creation and knowledge weaving during the entire operationalization

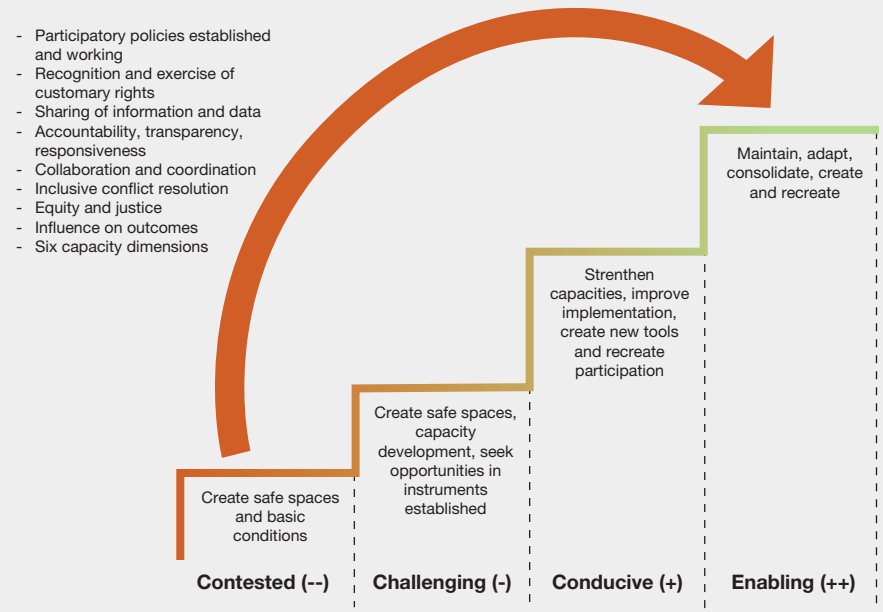


Figure 6 15 **Operationalization contexts.**

The bullet points in the upper left corner indicate the institutional framework conditions and the capacities, while the text in the stairs highlight actions which are of key importance to move from a more restricted to a more enabling context.

process. There is an explicit coexistence of different worldviews that are intertwined (Gupta *et al.*, 2010; Tengö *et al.*, 2014). These contexts promote effective participation, providing the necessary resources and conditions to do so, enabling a good quality of engagement of different stakeholders and actors, through the allocation of the necessary resources, promoting inclusion and enabling access to information to recreate accountability. During the design and implementation of assessments, a joint definition of the purpose of the valuation process, a joint analysis of the problem as well as the identification and integration of diverse values is promoted, recognizing different types of legitimation and validation in diverse sociocultural systems. Existing capacities permit tracing decisions, choosing, adapting, developing and implementing appropriate policy options. Actors and stakeholders are strengthened in many of their capacities, they are motivated, aware of and understand the relevance of diverse values. Actors have access to and are capable of using information, knowledge and tools. They are capable of bridging knowledge systems, knowing how to mobilize, translate, negotiate, synthesize and apply multiple forms of evidence (Gibert *et al.*, 2017; Reed *et al.*, 2017; Tengö *et al.*, 2017). Mechanisms for peaceful conflict resolution, building consensus and balancing power, exist. Representativeness, inclusiveness and engagement of different actors and stakeholders are both desired and promoted (Kievelitz, 1996; Kothari, 2001; Leeuwis, 2000; Max-Neef *et al.*, 1993; Paniagua *et al.*, 2000; Reed *et al.*, 2009, 2017; Tengö *et al.*, 2014). Interventions are designed based on disaggregated data and information, allowing the mobilization of resources for effective participation that leaves no one behind, permitting a comprehensive engagement. Systematically information on accessibility requirements is used to improve engagement. Resources are addressed to diminish participation barriers, understand and balance trade-offs (Fish *et al.*, 2011; GIZ, 2011, 2018; Rodríguez *et al.*, 2006). More challenging types of contexts can be derived from the same literature sources.

Conducive contexts permit deliberation and participation but some of their conditions limit co-creation and knowledge weaving. Mechanisms, methodologies and tools to identify and promote participation are usually used. The design and implementation of these methodologies and tools are however not systematically based on disaggregated data and information, and therefore often lack effectiveness. Some power-sharing spaces (such as free, prior and informed consent – FPIC – and consultations) exist, and there is limited resource allocation to enable participation. Thus, there is a need to improve available data, accountability, responsiveness and implementation to reach the last (or first) mile. Participatory and peaceful resolution mechanisms exist, but because of their general design, way of implementation and/or lack of resources, are less effective. Engagement is possible, desired and promoted but there remains a need to improve the quality of engagement through capacity development. Actors are motivated, understand the relevance of, and are willing to apply pluralistic values, have access to information, and share knowledge and tools. Capacities and tools need to be strengthened for knowledge weaving. Trade-offs are understood but mostly not balanced. Mechanisms for conflict resolution, consensus-building and power balance exist, but need to be improved. Invisible power structures or specific powerful stakeholders might limit the possibility for uptake of diverse values into policy design.

Challenging contexts have limited institutional conditions and capacities to promote and use pluralistic approaches, participation and knowledge sharing. One worldview is dominant. Administration and powerful stakeholders are not aware of the relevance of diverse values and/or have little interest in recognizing them. At the practical level, only some groups share or have access to information. Groups that bear the negative impacts of policies and measures are not included. There is a lack of resources allocated to participation of marginalized actors, and limited access to processes and information. Official channels do not present information in a way that most groups can understand and make use of. Transparency, accountability and responsiveness are lacking. If consultations occur at all, this is on request and not planned. There are limited avenues to influence any policy, program and/or measure; influence is usually only achieved through specific individuals and/or channels.

In ***contested or restrictive contexts*** there is an absence of institutional conditions to promote and exercise pluralistic approaches. In most cases, one worldview becomes very dominant, and alternative perspectives are not encouraged or accepted. Restrictive governance frameworks crosscut all levels of administration, mostly occurring in strongly fragmented societies with severe socioeconomic, political and cultural disparities and imbalance of power between and within different groups. A small number of stakeholders dominate decision-making, particularly regarding access, management and distribution of resources. Conditions restrict, prohibit or ignore customary rights in laws, norms and regulations (e.g., traditional property rights). Institutions promote inequality, creating and recreating imbalance of power. Participatory spaces are prohibited, and there is closed and/or exclusive decision-making. Administration has no interest in and/or is not allowed to recognize values other than officially prescribed ones. These processes are neither appropriate nor legitimate for the majority of the society are not given. Access to information and knowledge is limited to particular stakeholders, who dominate communication, restricting and/or displacing divergent opinions, values and needs. There is not a peaceful conflict resolution mechanism, consultations are few, and there is only one direction of communication.

In a complex world, the distinction between different types of contexts and their worldviews is often not clear-cut. Boundaries are usually diffuse, and particular institutional conditions and characteristics of different types of contexts might coexist. Depending on particular situations, structural characteristics might stay, persist, disappear or need to be built. Thus, operationalization contexts may shift from being more challenging to more enabling and the other way around, depending on how specific governments and organizations work to improve or hinder the framework conditions. **Box 6.5** shares an example of how certain instruments and institutions could be improved to create a more enabling context.

6.5.2 Context assessment

To allow that actions are fit for purpose, it is important to tailor them to the specific context. It is only after the specificities of the context and stakeholders involved have been framed and understood that any meaningful efforts can be made to operationalize the concept of diverse values. To this end, a context assessment grid can be used (Annex 6.4 for details).

Table 6.9 summarizes options for values-centred actions. Different contexts usually offer varying opportunities for different actors to become engaged and for their actions to have impact, e.g., in enabling contexts national and subnational governments have a significant responsibility to act, while in challenging and contested contexts civil society, the academia and international organizations might reach a better impact than centralized actions which can even be undesirable or counterproductive (Annex 6.4). Contested contexts will generally allow the fewest options for action, while more enabling contexts usually offer a much broader range of possibilities. This means that any option suggested for contested contexts could also be used in all the other contexts. On the contrary, actions that are possible in more enabling contexts might be difficult, challenging and/or even counterproductive in more restrictive ones. A selection of policy support tools and instruments available in the different contexts is listed in Annex 6.4.

6.5.3 Operationalizing nature's diverse values in decision-making

This subsection presents a series of iterative steps to guide the integration of diverse values into decision-making. The steps are based on the IPBES Preliminary Guide regarding Diverse Conceptualization of Multiple Values of Nature and its Benefits (IPBES, 2015) and associated documents (Pascual *et al.*, 2017). Key insights are incorporated from other IPBES manuals and documents (e.g., IPBES Guide on Production of Assessments), as well as guidance developed by the United Nations Development Program (e.g., Capacity Development Methodology Users Guide, Institutional and Context Analysis Guidance note) (UNDP, 2008, 2012), the World Bank (Managing Knowledge Results) (Roberts, 2013), GIZ (Supporting Capacity

Box 6.5 Creating more enabling context in Kabukuri Marsh, Northern Honshu, Japan.

The example of Kabukuri Marsh in Northern Honshu, Japan, demonstrates how a move from the *status quo* often requires a radical transformation in the way in which natural, social and cultural spaces are conceptualised and managed. Here, transformative change involved a shift away from the formerly single-goal (and often antagonistic) focus of local farmers and conservationists as regards the *best* way of managing the wetlands, towards an integrated approach which balances rice production with the protection of wild geese. The resulting model of Fuyumizu-tambo or "winter-flooded rice fields", a practice to flood the rice paddies that had usually been left dry in winter, integrates the management of the wetland area for its ecological functions (including wild goose habitat) with local community development goals (founded on rice production).

This shift was enabled by a process of social learning, brokered by an external organisation (the Japanese Association for Wild Geese), which helped to build mutual understanding and respectful cooperation between stakeholders. It brought together the formerly divergent aims (and interest groups) under a common, cooperative strategy that recognises – and, importantly, attempts to safeguard – diverse values. Not only do the winter-flooded rice fields offer good habitat for ducks and geese to roost, feed, and rest, but the bird droppings provide a good fertilizer for rice, and the maintenance of water in the paddies helps to control weeds and insects. As a result, farmers are able to produce high quality rice without chemicals, which can be sold at a premium price in the market.

An essential feature of the transformation that took place in Kabukuri was the shift in perceptions and interactions on the part of different stakeholders. This embodied a move towards collaborative planning and management that both recognized and operationalized the concept of diverse values, promoting both environmental and economic agendas at the local level. In addition, this locally-brokered solution effectively contributes towards national and even international conservation perspectives. Under the rhetoric of wise use, Kabukuri-numa and the surrounding rice paddies is now designated as a Ramsar Wetland Site of International Importance.

Table 6 9 **Options available in different contexts (Annex 6.4).**

	Options available in...			
	Enabling contexts	**Conducive contexts**	**Challenging contexts**	**Contested contexts**
Institutional framework conditions	• Maintain, improve, consolidate and recreate institutional conditions for pluralistic approaches and policies • Support democratic processes, sectoral coherence and foster sustainability aligned values	• Improve and establish institutional conditions to foster pluralistic approaches, e.g., access to information, inclusiveness, equity, transparency and responsiveness	• Enable spaces for frank exchange of perspectives between different actors • Support inclusion of sustainability aligned principles in policies and plans • Address resources and capacity needs to ensure plural approaches to valuation	• Engage proactively in sustaiable production, consumption, land use and related decisions, building a safe space for exchange of perspectives
Capacities	• Promote capacities to nurture behavioural change	• Special attention to bridging and negotiation capacities, capacity for knowledge weaving, validation and addressing trade-offs • Foster inter- and trans-disciplinary research	• Strengthen all six capacities at all levels, especially at subnational levels	• Support curricula development that foster trans- and inter-disciplinary methods and peer learning
Collaboration	• Support vertical and horizontal coordination and communication	• Establish alliances among research institutions/ universities and government and support networks	• Encourage horizontal collaborations, and across (local and subnational & local and international) institutions	• Strenghten social interactions especially between civil society, private sector and subnational institutions, donors and international organizations.
Information	• Ensure credible information flows	• Generate and improve data on plural values	• Strenghten science-policy interfaces • Make information available and understandable for different audiences	• Support dissemination access and use of diverse information
Knowledge	• Advocate for non-conventional approaches to valuation involving knowledge sharing, co-production, bridging and weaving	• Support knowledge co-production and knowledge weaving	• Create 'safe spaces' for knowledge sharing and co-production • Highlight brightspot stories	• Establish opportunities for knowledge exchange for different actors and under different validation mechanisms
Implementation	• Sustain methods and approaches that support pural approaches to capture diverse values and promote shared values of sustainability	• Design and improve methods and approaches to support plural valuation approaches	• Support design and implementation of pluralistic approaches (e.g., confidential interviews, storytelling and dialogues) • Enhance advocacy and awareness among different influential stakeholders to promote inclusive and participatory decision making mechanisms	• Make alternative policy support tools and methodologies understandable, accesible and feasible for actors of alternative spaces.

Development, Integrating ES into Development Planning, Guiding Principles for Ecosystem Services Assessment and Valuation, Capacity Works) (GIZ, 2011, 2018; GIZ GmbH, 2013, 2015), the World Conservation Monitoring Centre (WCMC), as well as from expert knowledge of the authors of the chapter.

6.5.3.1 Weaving diverse values: An iterative stepwise approach to link guidelines, valuation steps, and the policy cycle

Capturing the different values of nature and making them explicit in norms and institutions is constrained by several challenges, such as socio-political exclusion,

power imbalances, resource constraints, or knowledge asymmetries, among others (see 6.4). To overcome these challenges associated with knowledge and operationalization gaps, a collaborative approach is needed which addresses power imbalances, trade-offs and conflicts (GIZ, 2011, 2018; GIZ GmbH, 2013, 2015). For this reason, the valuation steps outlined by the IPBES preliminary guide on values and valuation (IPBES, 2015) are combined with the five tasks proposed by Tengö *et al.* (2017) and the theoretical inputs from Gupta *et al.* (2010) as being necessary for successful collaboration, weaving and cross-fertilization of diverse knowledge systems.

If different values that are aligned with sustainability and justice are recognized, accepted and respected, then these can become a co-created part of "the society's" values and support "value-weaving" systems that shape decisions, policies and actions to foster more sustainable and just futures. **Figure 6.16** provides orientation for practitioners and decision-makers who carry out valuation and intend to use and uptake the results of valuation on how to operationalize diverse values in decision-making. The overall goal of the process is to identify, understand, recognize and consider different values in decision-making and policies: to "weave values for just and sustainable futures" as a dynamic, reflective and interactive process. Supporting this process, the figure links the concept of decision-cycle from Chapter 4 and the valuation steps outlined in Chapter 3. The steps proposed are not intended to be prescriptive, instead, they can and should be tailored to the context and purpose of valuation, adapted to the right stage of the decision-making cycle, and also should reflect stakeholder needs. The graphic depicts the main stages of the decision cycle and shows the corresponding process of operationalizing diverse values.

The figure represents the logic and flow of different stages of a process for integrating diverse values into decision-making and implementation. It moves from the core objective to the outer layers of the cycle, while cross-cutting guidelines are

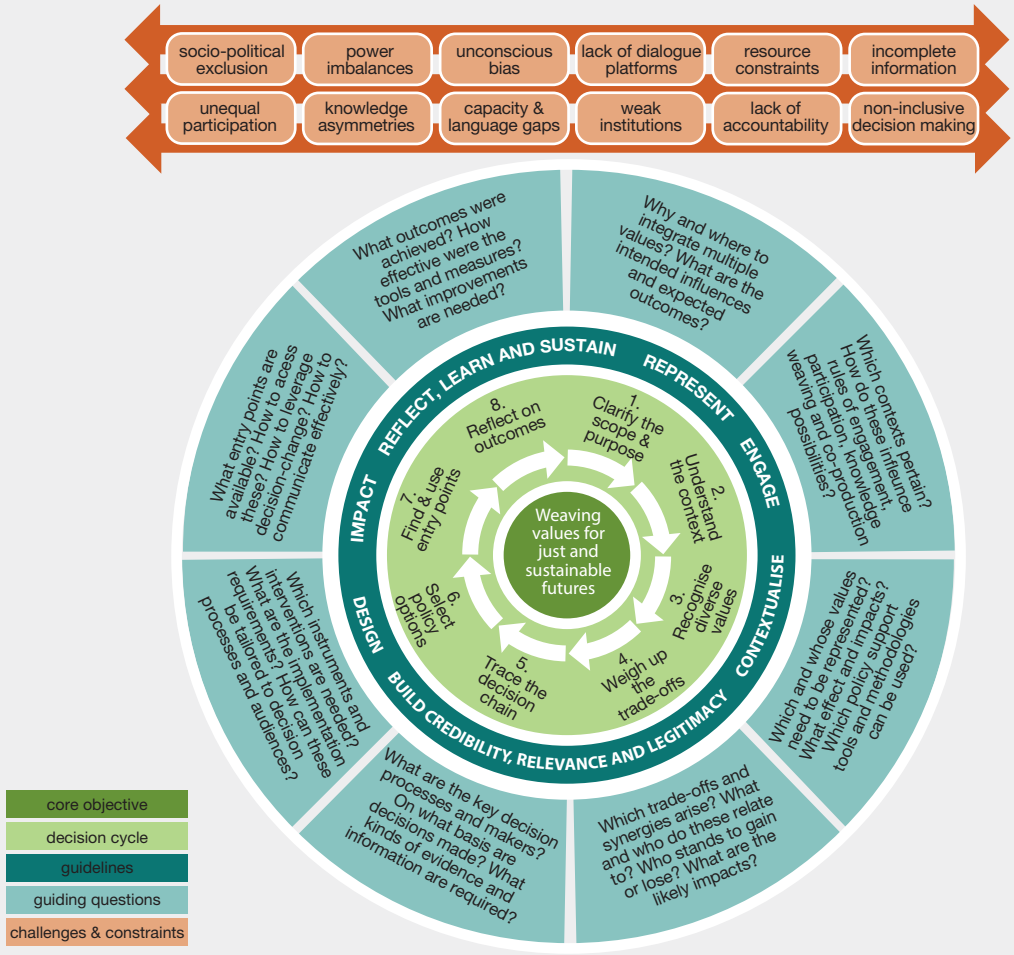


Figure 6 16 **The operationalization of diverse values in the decision-making cycle.**

considered at all the stages. The guiding questions cover the key issues to be addressed, while challenges and constraints can arise throughout the whole process (see more details in Annex 6.4). The conceptual framework is unpacked below in the consecutive subsections (see 6.5.2.2. and 6.5.2.3.) to describe how the process can be applied to operationalize diverse values at different scales, for different sectors and stakeholder groups, and towards different issues, goals and decision outcomes. The guidelines and the iterative steps for operationalizing the nature's diverse values in decisions brought together and synthesized the key aspects of already available guidance documents in one general framework – a selection of the most useful and online available tools and guidelines can be found in Annex 6.4.

6.5.3.2 Guidelines

Six key guidelines were identified which, if applied throughout the above suggested stepwise process or any other approach or policy intervention for the operationalization of diverse values, help overcome the challenges that hinder the uptake of valuation results in decision-making. The six guidelines include the following (see also **Figure 6.16**):

- **Contextualize** the entire decision-making process in synchrony with the values that underpin the biophysical, social, economic, cultural and political context in the target intervention area.
- **Design** decision-making processes that take into account capacities, knowledge and perspectives of stakeholders through equal, participatory, communicative, and conflict management approaches.
- Ensure a fair **representation** of diverse worldviews and values held by relevant actors (including stakeholders, right holders and knowledge holders e.g., indigenous peoples and local communities, gender diversity and youth, civil society organizations involved in conservation or development activity among others).
- **Engage** interactively with the relevant actors to promote dialogue, long-term collaboration and co-creation of solutions.
- **Strive for impact and legitimacy** by instilling a sense of co-ownership over valuation results by all actors who take part in the valuation process.
- **Reflect and learn** to ensure that decisions that impact nature and its contributions to people are aligned with the values and actions that can foster transformative change.

The identification of these guidelines was built on literature review (Berghöfer *et al.*, 2016; Gibert *et al.*, 2017; GIZ, 2018; Reed *et al.*, 2017). The emphasis is on ensuring that the guidelines presented respond to current knowledge and best practice, which is rephrased and reinterpreted specifically to deal with the concept and application of diverse values. **Table 6.10** gives exemplary actions on how each of the guidelines can be materialized in real life.

Table 6 10 **Guidelines and related actions.**

Key messages (KM) refer to relevant messages in executive summaries of all chapters of the assessment.

Guidelines	Related Actions
Engage	• Be aware of differentials and imbalances in power and decision-making influence between (and within) different actors, communities and societies; • Plan strategic/effective communication from the very beginning; • Be aware of capacity/skills needs for participation, collaboration and negotiation; • Allocate resources (human and financial) and develop a plan that allows for adaptive management; • Identify desirable and undesirable, intended and possible unintended impacts of the process; • Consider and respect different worldviews, perspectives, beliefs and knowledge; • Actively foster an enabling environment, promote agency and empowerment, encourage self-help, build in good governance (fairness, equity, transparency, social justice); • Develop a code of ethics and outline a process that requires mutual respect. *KM2.1; KM2.2; KM2.3; KM2.4; KM2.6; KM2.14; KM2.15; KM4.2; KM4.4; KM4.8; KM4.12; KM5.11; KM5.16; KM5.17; KM6.4; KM6.11; KM6.13*
Contextualize	• Understand the context; • Tailor the process to the real-world context and the identified practical/policy purpose; • Define the stakeholders, participants and audience, their needs, perceptions, roles and standpoints; • Identify the purpose of the knowledge weaving and co-production from the beginning. *KM2.5; KM2.6; KM2.9; KM2.13; KM2.6; KM4.7; KM6.7; KM6.16*

Guidelines	Related Actions
Design	• Ensure stakeholder representativeness, leave no one behind; • Systematically identify and represent diverse knowledge holders, intermediaries, research users, knowledge needs and priorities in environmental management to identify and engage with change agents; • Consider the ethical implications of engaging with different stakeholders; • Understand and account for power dynamics; • Identify knowledge brokers, bridging and boundary organizations, and their relationships. *KM2.9; KM2.11; KM2.13; KM3.7; KM4.2; KM4.4; KM4.7; KM4.12; KM5.1; KM5.10; KM5.11; KM6.1; KM6.13*
Represent	• Embed interactive engagement and knowledge co-production in the process; • Create a safe and collaborative space in which those involved can effectively listen to each other, share knowledge and skills, explore new ideas, learn, adapt and apply the knowledge they gain; • Promote mutual learning about each other's histories, values and existing knowledge; • Actively seek to create trust, transparency, respect and openness; • Make use of appropriate techniques, instruments and methods taking account of the cultural, governance, institutional and socio-economic context; • Foster dialogue within and between different groups, build long-term relationships, support and strengthen networks; • Work with good facilitators; • Understand different actors' needs and interests; • Create opportunities for informal interaction and learning spaces; • Work with stakeholders to interpret the implications of your work for policy and practice, and co-design communication products. *KM2.8; KM2.10; KM2.11, KM2.12; KM2.14; KM3.3; KM3.6; KM3.11; KM4.4; KM4.7; KM5.2; KM5.10; KM5.13; KM6.1; KM6.13*
Impact	• Focus on delivering tangible results as soon as possible that will be valued by as many stakeholders as possible; • Plan for measures to foster validation within and between knowledge systems; • Identify quick wins where tangible impacts can be delivered as early as possible in the research process, to reward and keep likely users of research engaged; • Get timing right; • Develop processes and products that are coherent as regards policy frameworks (especially those of intended end uses); • Embed the process and product within participating institutions; • Focus on identifying opportunities for scaling up (changing institutions, policies, rules, laws) and scaling out (replication across region and stakeholders); • Consider boundary objects and collective action; • Be performance oriented. *KM2.4; KM2.9; KM2.10; KM2.12; KM3.5; KM3.10; KM3.14; KM4.5; KM4.10; KM5.14; KM5.20; KM6.2; KM6.5; KM6.6; KM6.10: KM6.15*
Learn, reflect and sustain	• Create a learning loop with actors: jointly monitor and reflect on process; • Share good practice, perceived successes and shortcomings; • Consider how to sustain processes in the longer-term, and how to adapt to changing need and circumstances; • Scaling deep (Changing relationships, cultural values, beliefs); • Create continuous and periodic opportunities for reflection and evaluation; • Allow for the validation of knowledge representations; • Engage in iterative knowledge co-production; • Direct processes and products towards aspirational common futures and change pathways; • Learn from peers. *KM2.4; KM2.14; KM2.15; KM3.15; KM4.6; KM4.9; KM413; KM5.18; KM5.19, KM5.21, KM5.22; KM5.23; KM5.24; KM6.2; KM6.9*

6.5.3.3 The iterative steps of operationalizing the nature's diverse values

To operationalize the diverse values of nature in decision-making in a context-specific manner, which consider stakeholders' specific needs and available leverage points, an eight-step procedure can be followed (see the light blue circle in **Figure 6.16**). These eight steps are synthesised here based on the preceding chapters of the *values assessment* and are described below in more detail.

Step 1: Clarify the scope and purpose

The first step clarifies the scope and purpose of the valuation with relevant actors, aligns it with the relevant stage of the policy cycle, and supports policy uptake from the beginning. Being clear about the purpose and the envisaged outcome of the valuation before the study has been designed and methods selected helps align it with the intended use (and users) of the results and ensure that it fits to purpose (see Chapter 3 and 4). This step includes answering the questions of which decision-making process it links to, what are the associated policy and management challenges, what is the objective of valuation, who and what

does it seek to influence, and which outcome or change it intends to set in motion (Berghöfer *et al.*, 2016; GIZ, 2018; Laurans *et al.*, 2020). This enables one to choose the right combination of methods and to design a feasible process considering the context (see 6.5.4) and resources available, which highly influences the end results of valuation. Understanding the purpose also creates space for reflection to use appropriate policy support tools and methodologies to identify and capture different values in a specific place.

Once the purpose is set, the geographical, institutional, and sectoral scope, as well as the key stakeholders can be identified (Ash *et al.*, 2010; GIZ, 2011; IPBES, 2015). Mapping the stakeholders at the beginning of the process helps better characterize the context and support a joint definition of the purpose. Additionally, it contributes to building legitimacy. Relevant stakeholders include individuals and groups that will be affected by the decision-making process, and those that are responsible for making the decision, setting the policy, or leading the management actions that the valuation exercise seeks to influence (see Chapter 3 and 4) (Berghöfer *et al.*, 2016; GIZ, 2018; Reed *et al.*, 2009).

Understanding and respecting different validation mechanisms within and between groups is a major topic to ensure credibility. This includes developing a shared understanding of the issue at hand, how it will be addressed, and which questions are asked to ensure that diverse values are incorporated. Legitimacy and effective implementation at later stages highly depend on whether a clear and resource-efficient workplan has been set up and discussed and agreed with key stakeholders from the onset.

Tools that assist this first step include brainstorming sessions, problem tree analysis and mind-mapping, among others. Relevant background literature and data should be collated and reviewed to inform the framing and diagnosis of the issues to be addressed. Motivational and analytical capacities are of key importance to successfully accomplish this step (see Chapter 3).

Step 2: Understand the context

The second step aims to understand the specific factors and conditions that shape how, and to what ends, the concept of diverse values should be operationalized (Section 6.5.4 provides a detailed explanation of different contexts and related conditions, capacities and action points). This helps discover both opportunities and challenges to identify, understand, integrate, reflect and support pluralistic approaches. A rapid context assessment (Annex 6.4) can be a start to map existing conditions and capacities and to highlight the ones to be improved. Understanding whether the context is more enabling or more contested provides orientation for the design and implementation of different actions to increase opportunities and reduce risks for sustainability (see Chapter 3 and 4). Design and implementation should consider power dynamics, knowledge and operationalization gaps, forms of knowledge generation and validation, to achieve the desired impacts through place-specific interventions.

Offering safe spaces for interaction expresses care for stakeholders, supports fair social interaction, and contributes to *'leaving no one behind'*. A needs and capacity assessment provides a comprehensive analysis and specific recommendations for valuation uptake in policy design and implementation. Stakeholder consultations help refine and focus the objectives and scope to reflect the realities of the on-the-ground situation and enable new perspectives and knowledge to be built into the design. It is also a critical step in leveraging buy-in and acceptance from those involved (strengthening credibility and legitimacy), including the groups who may ultimately be responsible for acting on the valuation results (Ash *et al.*, 2010; Berghöfer *et al.*, 2016; GIZ, 2011, 2018; Laurans *et al.*, 2020; Reed *et al.*, 2009, 2017). Involving different actors with strong dependencies and impacts on the ecosystem helps consider cultural patterns of social interaction.

The shared understanding of the management problem and the first overview of the different types of values create alliances and a solution-oriented approach. It helps to ensure that key participants support the valuation process and will also be committed to the uptake of the results (see Chapter 3 and 4). Having agreed the broad boundaries and scope of work, stakeholder mapping, face-to-face meetings and/or bilateral interviews can be used to identify additional groups to be engaged. Starting with a small workshop to discuss the values approach, inviting representatives of different civil society and indigenous groups, communities as well as government organizations, universities and research institutions, can help better understand the context *(ibid).* Either an existing or a newly established task force or working group can be mandated at this stage to coordinate the process and create a stakeholder engagement and communication plan covering the rest of the process. Analytical, governance and social networking capacities are the most crucial at this stage.

Step 3: Represent diverse values

The third step of the value-weaving process is focusing on how to identify and capture instrumental, intrinsic and relational values of nature in the given scope and for the chosen purpose (see Chapter 3). Key questions to answer include whose values are in place, how they will be addressed, whether all relevant actors and values are considered, and if someone is missing how the missed ones can be brought on board. During the design it is critical to choose the right combination of nature-, behaviour-

and statement-based valuation methods that should be appropriate for the study questions and/or policy issues to be addressed in the specific context. Study and policy questions are in turn shaped by the study's purpose and scope.

When identifying the diversity of values across different value foci, it will sometimes be the case that value trade-offs and incommensurability among values will be encountered and thus need to be acknowledged. This requires that the unequal power relations among those holding conflicting and incommensurable values are addressed. This is the stage where relevant nature's contributions to people and ecosystem services are identified and classified in relation to the management challenge, the purpose and the scope. This also implies analysing conditions, trends and underlying causes of degradation and unsustainable use of different ecosystem services and nature´s contributions to people, which at the same time are related to the values and worldviews held by different stakeholders. Appropriate policy support tools and methodologies to capture those values should be selected regarding the context, purpose and types of values to be addressed (see Chapter 3). Lastly, the third step also gives space for reflection on who is selecting the valuation methods, which are the possible strengths and weaknesses of the selected approach, and whether and how an inter- and transdisciplinary valuation team can be organized to foster integrated valuation. To accomplish this step, analytical and bridging capacities are crucial.

Step 4: Weigh up the trade-offs

The aim of the fourth step is to identify the factors that shape people's behaviour and actions, understand their motivations, and identify synergies and trade-offs considering differences in time, location, and cost-benefit distribution. Values are inherently related to stakeholders and actors. Analysing social interactions, representation, interests, rights and needs helps understand how these determine the way in which stakeholders depend on, interact with, use and impact nature (see Chapter 2 and 3). Trade-offs emerge when values and needs differ, and therefore often imply conflicts among different stakeholders who can benefit and/or carry on the costs of decisions made. The ways that trade-offs are solved influence the development pathway and the well-being of stakeholders *(ibid)*. Weighing up trade-offs can contribute to alleviating environmental and social conflicts, improving outcomes of negotiations and supporting inclusiveness in decisions and policies. It also provides information on which incentives need to be changed to decrease negative impacts on ecosystems and people. The management of trade-offs implies balancing power asymmetries, creating the space to clarify, discuss and recognize different perceptions and values, supporting knowledge weaving and setting the basis for constructive negotiation *(ibid)*.

Different tools and formats such as bilateral and group consultations can be used to collect, elaborate and complete information as well as co-produce and weave knowledge systems of diverse actors and stakeholders. Validation of the results and consideration of possible future actions might consider the particularities of the context (see Chapter 3). Key questions to address include who wins and who loses, what is needed to manage trade-offs, what are the main opportunities, challenges and risks related, and whether more beneficial alternative scenarios exist, considering their feasibility. Analytical, bridging and negotiation capacities are highly relevant at this step.

Step 5: Trace the decision chain

The fifth step brings together all the information collected during steps one to four and links them to possible policy interventions to effectively operationalize diverse values in concrete decisions and management actions. It involves defining the means of influencing decision-making and achieving a more just and sustainable future.

The fifth step fosters a joint reflection on what and how should be changed, and who should be involved and how (GIZ, 2011; Reed *et al.*, 2009; Wiek, Withycombe, Redman, *et al.*, 2011). Identifying key decision processes as well as related stakeholders and actors to address trade-offs will contribute to leverage change. An upgrade of the communication strategy could support outreach for change, knowing better what kind of decisions and decision-makers as well as other relevant audience should be addressed,

Decision chains are not unitary, but typically incorporate many different dimensions, and are variously understood and experienced by different stakeholders. Therefore, a collaborative – engaging diverse stakeholders and knowledge systems – review of possible interventions according to the policy cycle can provide orientation and discover potential actions and limitations (see Chapter 4). An in-depth understanding of the policy process and the associated organizational dimensions, as well as the knowledge of how decisions are made, will strengthen the policy uptake. The analysis of decision-making involves different aspects of how individuals make choices, and how they value alternatives inside the specific context in which they act.

By making the links between nature and society visible and tangible, valuation can support more equitable, sustainable and inclusive planning and decision-making across different sectors and contexts (Ash *et al.*, 2010; GIZ, 2011, 2018). To make transformative change possible, the assessment should be embedded into the policy process from its start and be considered as a means to change the perceptions of and relations with nature (see Chapter 4). As a social process, it seeks to establish a connection between

ecosystems, societal needs and decision-making – and, as such, creates the space for knowledge weaving and co-production, shaping the values and perspectives of stakeholders and actors involved. As with earlier steps of the assessment process, efforts must continue to ensure that the information being produced meets the target audience's needs and is also generated and presented in a way that is credible, relevant and legitimate in the light of these needs and interests. At this step, analytical, bridging, negotiation and governance capacities are equally important.

Step 6: Select policy options

The sixth step is a key in the valuation uptake where a move from information gathering to a more action-oriented identification of concrete responses and measures happens. Key interventions areas are identified that could act as leverage points and address the drivers of degradation and unequal distribution.

Possible interventions could range from shallow leverage points, i.e., easy actions to implement with small impacts on changes (e.g., working at municipal levels, introducing participatory planning, design and/or implementation of standards and safeguards, target investments) to deep leverage points that have a strong impact on transformative change (e.g., policy reforms that address underlying causes of degradation and unequal distribution, establishment of new institutions for a more inclusive government, ecological fiscal reforms etc.) (see Chapter 4 & 5). Interventions can address three main areas: (i) institutional dynamics (restructure); (ii) human-environment interactions (reconnect); and (iii) sustainability-related knowledge creation (rethink) (Abson *et al.*, 2016; Göpel, 2016; Meadows, 1999). The type of interventions planned should consider the institutional characteristics and different capacities of the specific context, also including the mobilization of financial and human resources as well as timespan and political support.

Different policy options and alternatives to operationalize diverse values can be considered, supporting policy coherence and subsidiarity across different levels of interventions (see 6.2, 6.3). Policy options can be mutually reinforcing constituting a policy mix – i.e., mechanisms and approaches which strive to create a *'whole that is greater than the sum of the parts'*. The combination of different policy options and instruments is particularly relevant to integrate diverse, sustainability-aligned values, since it allows the consideration of multiple needs, perspectives, different knowledge systems and stakeholder groups to become effective, inclusive and legitimate. To ensure that the policy options selected address the context-specific needs of stakeholders, both customary norms and formal rules and regulations can be considered as appropriate ways of design and implementation. The selection of the policy options also depends on the institutional capacities and the potential adverse impacts of different measures and instruments.

Valuation can play a role in selecting options at all steps in the policy cycle (see Chapter 4). For example, during awareness-raising, valuation can help to mainstream an issue by showing data or explaining the potential consequences of a particular course of action. In relation to problem definition, it can be used to explore an issue and attempt to explain and clarify what challenges arise, what causes these, and what the consequences are for different groups. During agenda setting, assessments can be used to generate information and lend credibility and legitimacy to a policy issue. Valuation can support policy development, by helping to explore different options and scenarios, and highlighting the advantages and disadvantages of different responses (see Chapter 4). At the implementation stage, valuation provides guidance on how and where to implement pluralistic approaches and measures, and where adjustments could be made. Additionally, valuation could contribute to monitoring the impacts that the selected policy option had on the problem situation *(ibid)*. To successfully accomplish the sixth steps, motivational, governance and negotiation capacities are crucial.

Step 7: Find and use entry points

The seventh step of the value operationalizing process seeks to find and use entry points to integrate diverse values into decision-making. Entry points should be related with the drivers of change and policy options that were identified in previous steps to support change. Entry points are windows of opportunity that allow us to place an issue on the political agenda and should be connected to policy issues in order to receive the attention of decision- makers (Abson *et al.*, 2016; GIZ, 2018; Göpel, 2016). There are multiple ways to achieve this, and there is no clear structure or process involved in identifying and using entry points. They simply relate to any process, be it circumstantial or programmatic, which creates an opportunity to influence decision-makers. The valuation process can either be used as an entry point to obtain political relevancy or can also act as one, since they generate knowledge and provide recommendations to improve policy (see Chapter 4). If it is tailored to specific policy issues and are well communicated from the beginning, valuation can deliver a new issue that decision-makers were not previously aware of, or it can highlight or explain certain aspects of an existing issue. Valuation exercises can mobilize citizens, inform and examine different options or scenarios to deal with a socio-ecological problem (see Chapter 3 and 4).

To ensure the uptake of valuation, an effective communication strategy is needed from the beginning, involving different stakeholders, influencers and champions

who can also support the consideration of diverse values and plural approaches aligned with sustainability. Communication may not be as simple as it first appears and can be layered with traps and pitfalls. Some barriers include selective perception, information overload, emotions, language-barriers, differences in culture, gender, preferences, values and belief systems. Improving the effectiveness of communication is possible by using standard and precise terminology, providing space for clarification and feedback, supporting regular interaction, and working also with nonverbal communication such as body language, intonation or attire. Public environmental decision-making is mostly driven by several aspects such as public risk perception, available solutions, legal obligations, etc. (GIZ, 2018). Therefore, to successfully influence a policy process, valuation needs to relate to these aspects (Berghöfer *et al.*, 2016; Laurans *et al.*, 2013, 2020). To effectively identify and use the entry points, motivational, governance and social networking capacities are of key importance.

Step 8: Reflect on outcomes

The last step of the values-weaving process attempts to support the reflection on the process regarding impacts of the different actions implemented. This step consists of an evaluation of the policy decision after it has been implemented. Thus, effects and changes are monitored over a given time to determine the effectiveness of the intervention, seeking for adaptation. This step is related to monitoring and evaluation, supporting adaptive management to improve actions towards the desired outcomes, and observing how the situation and relationship of different actors changed and how decisions were taken and enforced. At the same time, it assesses conditions and trends of ecosystems and analyses where and how to improve. Once a decision has been made on how to approach the issue, alternative or adapted policy instruments could be implemented, which requires assistance from many different actors and therefore links iteratively back to the first steps of the operationalization process. Successfully accomplishing the last step of the process requires analytical, motivational and governance capacities.

6.5.4 Operationalizing the diverse values of values in decisions to achieve the Sustainable Development Goals

The SDGs are a key part of today's dominant development rhetoric, guiding both global and national policy agendas, as well as funding flows. This forces us to deliberate about what needs to be done to achieve the SDGs, including reconsidering which structures and practices need to be changed (Linnér & Wibeck, 2020). By advocating a just and sustainable society, the 2030 Agenda implies that there is a need to adopt a much wider set of alternatives to realize this desired future, that goes well beyond past and present efforts (Linnér & Wibeck, 2019). Many authors have noted the interdependent, and at times, conflicting nature of targets across goals (ICSU & ISSC, 2015; Nilsson *et al.*, 2016). Such synergies and trade-offs need to be considered, including the potential for both positive or negative impacts on different stakeholders and actors (Fish *et al.*, 2011; GIZ, 2011, 2018; Rodríguez *et al.*, 2006).

Diverse values and approaches currently play only a minor role in the global discourse that surrounds the SDGs. Often local priorities or values may differ from globally chosen indicators of sustainable development (IPBES, 2019a). Consequently, for instance, although indigenous peoples and local communities (IPLCs) make a significant contribution to many SDG targets, their knowledge, experiences, and needs are reflected weakly in the development of options to implement Agenda 2030. Yet the recognition and consideration of diverse values is key to achieving the transformative change that is required to make Agenda 2030 possible (IPBES, 2019a).

It follows that there is a considerable need to increase efforts to integrate diverse values at both strategic and implementation levels, to reach the SDGs and effect transformative change. The comprehensive and cross-cutting nature of the SDGs' provides opportunities for better integration and balancing of poverty-environment concerns. For this, SDG-related measures need to challenge the institutional *status quo*; transform how we measure, understand, value and implement sustainable development; design interventions that reflect local visions of development; make trade-offs and potential synergies between SDGs explicit; and address the ultimate drivers of environmental degradation and poverty (ICSU & ISSC, 2015; Johnson *et al.*, 2019; Obersteiner *et al.*, 2016; Schleicher *et al.*, 2018).

Table 6.11 is a summary of how pluralistic approaches and diverse values can contribute to achieve all the SDGs, and a more detailed version is available in Annex 6.4. It was built by scrutinizing how each of the SDGs and their specific targets can be better achieved if diverse values and plural valuation approaches are used to enhance equity, resolve conflict, and find a better and more sustainable balance among trade-offs. The results are based on the findings of this assessment (especially Chapters 3, 4, 5, and 6.2, 6.3), other IPBES assessments, literature reviews and the review of related virtual platforms (the IPBES Catalogue, other digital platforms such as OPPLA and ValuES) (European Commission, 2022; GIZ, s. f.; IPBES, 2017). **Table 6.10** is accompanied by similarly structured but more specific tables which separately address each SDG (Annex 6.3).

The first row of **Table 6.11** indicates the types of policy support tools and methodologies that can support any or all of the 17 SDGs in categories, based on purpose of valuation, as follows: *informative* tools and methodologies (used to inform and reflect with stakeholders and for inclusive planning) (see *"informative"* in **Table 6.11**); *technical* tools and methodologies (used for research and to guide technical aspects of management or policy design) (see *"technical"* in **Table 6.11**) and *decisive* tools and methodologies (used to aid decision processes and for decision-making, to solve problems and for policy intervention) (see *"decisive"* in **Table 6.10**).

Next, **Table 6.11** identifies policy instruments across the four common instrument categories of Section 6.2 (economic and financial – E&F, legal and regulatory, L&R, rights-based and customary – R&C, and social and cultural – S&C) The policy instruments provide a means of considering and implementing plural approaches, recognizing different values, needs and interests. It should be noted that many of the instruments mentioned have the potential to integrate diverse values. However, their effectiveness depends on how they are designed, developed and implemented.

Table 6.11 then identifies leverage and entry points for the 17 SDGs. Entry points are understood as windows of opportunity to place an issue (in this case, diverse values) on the political agenda and support change (GIZ, 2018; Göpel, 2016; UNEP, 2011). They could either be very generic and/or similar in every SDG, or specific to particular contexts, usually addressing interests and needs of specific stakeholder groups. Importantly, a comprehensive strategy addressing different entry/leverage points, should be considered to boost transformative processes (Abson *et al.*, 2016; GIZ, 2018). Entry points can occur at all levels, and may take different forms, depending on the specific topic and context. Entry points can be processes and/or situations. Processes are pre-existing and ongoing structures and frameworks that can be used to make an appeal, persuade and put an issue into the political context (Abson *et al.*, 2016; GIZ, 2018). The design, review and/or implementation of policy instruments could also be considered as entry points such as development plans, spatial planning, multi-stakeholder platforms as well as policy and/or economic reforms. Four main categories of entry points relating to processes, can be identified: (i) policies (subnational, national, international), (ii) economic and fiscal incentives, (iii) sector policies, and (iv) governance, most of them could be found, fostering the consideration of diverse values through all SDGs (Ash *et al.*, 2010; GIZ, 2011, 2018; WRI *et al.*, 2008). In addition, specific situations provide a clear yet time-limited opportunity to get an issue into the political agenda. They could be among others, a change in government, elections, media attention, natural and/or made hazard and scientific findings that addresses issues of political or public concern. Ecosystem service assessments and valuations can be used either as an entry point to obtain political relevancy or can also act as one, since they provide knowledge, which can be used to base decisions on. In general, assessments can discover a new issue that decision-makers were not previously aware of, or they can highlight or explain certain aspects of an existing issue (GIZ, 2018). The table highlights some general and specific entry points that can be used to better achieve the SDGs.

The difference between entry and leverage points depends on the type and impact of the intervention made. Thus, leverage points could be understood as places where interventions can influence the behaviour of a system. (Meadows, 1999) identified 12 leverage points that range from easy interventions *(shallow)* to implement with small impacts (parameters and feedback) to *deep* leverage points that might be more difficult to implement but have a stronger impact on transformative change (design and intent), supporting to realign complex socio-ecological systems to the normative goals of sustainability. These deep leverage points could be addressed in three main areas: (i) institutional dynamics (restructure); (ii) human-environment interactions (reconnect); and (ii) sustainability-related knowledge creation (rethink) (Abson *et al.*, 2016; Göpel, 2016; Meadows, 1999).

Summary

This assessment of various policy options incorporating diverse values of nature available across sectors, implemented and advocated by governments, multilateral organizations and further across a broad set of stakeholders indicates a mixed picture. On the one hand we can see progressive evolution of policies, taking cognizance of interests of multiple stakeholders, multiple priorities and impacts on (and from) other sectors. Jurisdictional boundaries of policy options is narrowing, there is greater legitimacy for participatory approaches and socio-ecological planning. On the other hand, operationalizing the inclusion of diverse values of nature into decision making is highly contextual and subject to different constraints- political, different capacities, resources, among several others. That said, there is sufficient evidence to show how every member of society could contribute to ensuring inclusion of diverse values of nature in different decisions. Based on the evidence from across the different chapters, a summary of types of concrete actions across stakeholders to support the integration of diverse values in decision-making has been done (**Table 6.12** *that also provides examples of values centered actions across various stakeholder groups*). The assessment clearly points out that synergistic and concerted actions are needed from all actors in society upon a wide range of values-centred action points for achieving more just and sustainable futures.

Table 6 11 **Integrating diverse values and plural valuation approaches into policy, using the SDGs as an example.**

How can diverse values and plural approaches contribute to all the 17 SDGs?

Pluralistic approaches can capture the concepts within the goals more holistically, better inform actors about the values of sustainable development and ensure that they have the adequate skills and capacity to achieve sustainable management, and enhance understanding, education and capacities of all actors on pluralistic values in education, awareness-raising and human and instiutional capacity building and to lead sustainable livelihoods in harmony with nature

Identifying, engaging, supporting and strenghtening actors and communities (including ILK), and using integrated and holistic management approaches that bring together different actors and sectors is key to better meeting and achieving the targets and goals and improving management, resource-efficiency, coordination, accountability, transparency and resilience, motivating and mobilizing support and conservation among actors, and ensuring sustainable use

Ensuring ILK, IPLCs, and small business interests are integrated into national policies, strategies, value chains and national and local planning enhances development processes and poverty reduction, prevents favoring of unsustainable practices, and fosters understaning on the interdependency and linkages to reduce environmental impacts

Better understanding of the knowledge of, needs, and rights of different actors can allocate appropriate roles to custodians and rights-holders, recognize fair and equitable sharing of the benefits, define more effective implementation strategies, promote learning about culture and nature, create more equitable acces and use, ensure safety and equal access to justice and end violence, and ensure a better quality of life

Well formulated needs and aspirations of different groups and capacity development can alleviate disproportionate dependance, stress, and environmental poverty, and reduce unemployment and precarious employment, differential access, greater opportunity costs and social and economic inequities of the poorest, marginalized and most vulnerable leading to better quality of life and sustainable livelihoods in harmony with nature

Which value-focused policy support tools & methodologies can be used?

Informative

Participatory rural appraisal, cross culture approaches, visual and multimedia based participatory methods, holistic valuation systems of life of Mother Earth, holistic or integrated planning approaches, landscape approach, guidelines or toolkits for mainstreaming cross-cutting areas in development planning, indicators partnerships

Technical

Mapping, surveys, interviews, observation and field notes, rapid and full sector assessments and prioritization, action research, group models or network analysis, impact assessments, world databases, disciplinary and comparative research methods, vulnerability assessments, ethnographic methods for cultural and social assessments and valuations, preference methods

Decisive

Toolboxes designed tor multiple stakeholders or integrated approaches, deliberative methods, multi-criteria decision analysis (MCDA), sector-based valuation frameworks, toolkits for site-based assessments

Examples of policy instruments & interventions

Economic and financial

Economic restructuring, alternative measures of economic welfare, Payment for Ecosystem Services, ecological fiscal transfers, ecosystem accounting, biodiversity financing (incl. ODA), REDD+, taxes on consumbion, environmental subsidies, biodiversity relevant taxes, charges and fees, biodiversity offsets.

Legal and regulatory

Legally protected areas, multilateral agreements, national legislation; environmental impact assessment, legislative control over pesticide use, commodity chain regulation, voluntary codes of conduct and guidelines, IPLC managed areas, environmental and social standards, NBS.

Rights-based and costumary

OECMs, ILK revitalization, IPLC-led codes of ethical conduct, Free Prior and Informed Consent (FPIC)

Socio-cultural

Co-management, environmental education, certification and labelling, behaviour nudges for reduced consumption, socially responsible investments, corporate social responsibility

Examples of leverage and entry points

Sector-based examples: Sector management plans at different levels; revision of laws and regulations; sector and international conferences

Cross-cutting examples: National Adaptation Strategies; National development Plans; NDCs; Access to Climate and Biodiversity Finance

Situational examples: Respond to natural hazards; elections; participation in and/or hosting international meetings and conferences (such as CoPs)

Table 6 12 **Action points related to inclusion of diverse values in decision-making on nature and Responsibility of different actor groups.**

ACTORS

VALUES-CENTRED ACTION POINTS	Inter-governmental organizations	National and subnational governments	Non-governmental organizations	Academia	Citizen groups/IPLCs	Private sector	Media
Embed diverse values into decisions	Promote the incorporation of diverse values into national biodiversity strategies	Implement policies that articulate diverse values	Develop values-centred safeguards	Address knowledge gaps	Mobilise sustainability-aligned values	Implement standards for values-based corporate responsibility	Communicate on the diversity of values of nature
Foster policy coherence across sectors based on sustainability-aligned values	Align policy with value diversity	Establish coordination mechanisms among sectors around shared values	Foster initiatives to make visible diverse values	Advance inter and trans-disciplinary research on values	Advocate for recognition and respect for diverse values	Engage in cross sectoral dialogue to build shared values	Highlight stories of successful values alignment
Ensure representation of stakeholders' values	Develop standards for inclusive participation in decisions	Encourage participatory policy design	Support valuation uptake in policy decisions	Assess representation in valuation and its outcomes	Promote respect for marginalised worldviews and values	Adopt practices of inclusive participation	Promote public debates on the diverse values of nature
Enable capacities to embed diverse values into decisions	Address barriers (e.g., knowledge of trade-offs) to develop capacities of stakeholders	Enable mechanisms for policy uptake of plural valuation	Support capacity development activities based on nature's values	Build research programmes to strengthen the transformative potential of values-centred leverage points	Network to foster peer to peer learning	Support capacity development on values-based corporate sustainability standards	Train communication experts (including local communicators) on the role of nature's values
Strengthen co-learning among stakeholders to develop shared values	Promote projects that entail cross sectoral planning by highlighting best practices	Encourage collaborative learning across scales and sectors	Document good co-learning practices across actor groups	Promote research incorporating different knowledge systems	Support awareness raising among peers	Promote co-learning with affected stakeholders	Communicate on how shared values are built
Enhance resource mobilisation for plural valuation and policy uptake	Foster international commitments to undertake plural valuation and uptake	Allocate resources for capacity building to support uptake of valuation	Ensure project funding is targeted to addressing key gaps	Channel resources tor plural valuation research	Support crowdfunding to enable wider participation in decision making	Allow for plural valuation and its uptake	Highlight gaps in resource availability

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ANNEXES

Annex I - **Glossary**

Annex II - **List of authors and review editors**

Annex III - **List of expert reviewers**

ANNEX I
Glossary

A

Actor
Actors may be understood as individuals operating certain roles or functions in society. Hence, the same individual may for instance (i) serve as a political actor, (ii) operate as an economic actor, and (iii) act as a community member/citizen. They may therefore emphasise different goals and values when dealing with particular issues. For this reason, the values assessment uses a typology that includes these actors recognizing the fuzzy relationships that exist among them *(see Chapter 6).*

- **Affected actors:** People and organizations who are directly involved in (and dependent on) the implementation of biodiversity related decisions and have their own stakes and interests.
- **Key players:** People and organizations who both can influence and become affected by decisions - that is, in certain contexts, they serve as influencers, while at the same time are involved in actual decision making (Grimble & Wellard, 1997; Miles, 2017).
- **Influencer:** People and organizations who influence decision-making processes related to biodiversity and therefore have an impact on those who implement the decisions.

B

Behaviour change
Interventions can close or 'bridge' the gap between values and behaviour by ensuring that the various conditions are met that together enable people to act consistently with sustainability-aligned values. These conditions can be categorized as providing (i) capability, (ii) opportunity and (iii) motivation to act. *Source: Chapter 5.*

Biocultural diversity
Biocultural diversity is considered as biological and cultural diversity and the links between them (CBD, 2019). *Source. IPBES Global Assessment glossary.*

C

Capacity development
Process through which individuals, organizations and society obtain, strengthen and maintain their capability to set and achieve their own development objectives over time. *Source: Chapter 6.*

Capacity dimensions
Capacity development can be described across six broad capacity dimensions. **Motivational capacity** builds awareness and desire to consider multiple values. **Analytical capacity** provides knowledge and tools to analyse multiple values. **Bridging capacity** brings together different ways of knowing and doing, often creating new knowledge in the process. **Negotiation capacity** navigates trade-offs and mainstreams into policy and practice. **Social network capacity** is the capacity to learn together, act and adapt or transform. **Governance capacity** creates formal and informal mechanisms for a socially just governance environment. These dimensions embody many concepts and principles for capacity development and recognition in decision making. *Source: Chapter 6.*

Communication
"A two-way process aimed at mutual understanding, sharing of values and action." (Hesselink *et al.*, 2007).
Source: Chapter 5.

Conflict
Refers to a situation where opposing attitudes, beliefs, identities, interests, norms or values coexist. This can lead to an active disagreement between people. Conflicts are likely to arise when individuals or groups in a given decision-making process feel their values are being ignored; or when they cannot agree on the underlying value rationality, or the way in which values will be integrated, traded-off or reconciled to inform a given decision. When different values collide in a decision-making situation, the conflict can be described as a value conflict. *Source: Chapter 2 and Chapter 4.*

Conventions
They refer to practical rules about how to undertake certain actions. They simplify interaction and facilitate coordination. Examples are the language, measurement scales (e.g., money, weight., length) and directions. Management systems, professional codes and dressing codes are other forms. *Source: Chapter 2.*

Crowding out
It has been hypothesized that the rise of economic incentive approaches (so-called 'market-based' approaches) in environmental policy making, could lead to a change in values towards a commercialization of nature (i.e., people putting more weight on instrumental values and less on intrinsic values of nature in decision-making). This risks undermining intrinsic motivation or pro-nature values and mindsets. *Source: Chapters 4 and 5.*

D

Decision-making
The process of making decisions can happen at the individual level or amongst groups and entails the prioritisation of certain values. This prioritization greatly influences which issues are found worthy of consideration, do and do not become part of the agenda, as well as determine which decision-makers are considered socially legitimate to participate in the process. *Source: Chapter 1.*

E

Ecosystem services
The benefits people obtain from ecosystems. In the Millennium Ecosystem Assessment, ecosystem services were divided into supporting, regulating, provisioning and cultural. This classification, however, is superseded in IPBES assessments by the system used under "nature's contributions to people". This is because IPBES recognises that many services fit into more than one of the four categories. For example, food is both a provisioning service and also, emphatically, a cultural service, in many cultures. *Source: IPBES Glossary.*

Epistemology
Epistemology is the theory of knowledge. It is concerned with how we know what we know; in other words, it relates to methods for producing knowledge (their assumptions, methods, scope). *Source: Chapter 1.*

G

Governance
A comprehensive and inclusive concept of the full range of means for deciding, managing, implementing and monitoring policies and measures. Whereas government is defined strictly in terms of the nation-state, the more inclusive concept of governance recognizes the contributions of various levels of government (global, international, regional, sub-national and local) and the contributing roles of the private sector, of nongovernmental actors, and of civil society to addressing the many types of issues facing the global community (IPCC, 2018). *Source. IPBES Global Assessment Glossary.*

Governance framework
Taken together, the institutional framing of specific economic, political decision-making and socio-cultural processes of relevance to the governance of human-human and human-nature relationships are termed governance frameworks. *Source: Chapter 2.*

H

Human rights
The inalienable fundamental rights of each and every human being as acknowledged in the United Nations Declaration of Human Rights (United Nations, 1948). Arguments of intragenerational justice basically refer to human rights. *Source: Chapter 5.*

Human-nature relations
The ways in which people relate to and engage with the natural environment, which are diverse and linked to worldviews, values and attitudes embedded in daily life (Flint *et al*., 2013; Macnaghten & Urry, 1998; Schultz *et al*., 2005). *Source: Chapter 2.*

I

Incommensurability
Absence of a common unit along which values can be measured and compared. *Source: Chapter 2.*

Indigenous and Local Knowledge (ILK) systems
Indigenous and local knowledge systems are social and ecological knowledge practices and beliefs pertaining to the relationship of living beings, including people, with one another and with their environments. Such knowledge can provide information, methods, theory and practice for sustainable ecosystem management. *Source: IPBES Glossary.*

Indigenous and Local Knowledge holders, Indigenous and Local Knowledge Experts , and Experts on Indigenous and local knowledge
Indigenous and local knowledge holders are understood to be persons situated in the collective knowledge systems of indigenous peoples and local communities with knowledge from their own indigenous peoples and local communities; indigenous and local knowledge experts are understood to be persons from indigenous peoples and local communities who have knowledge about indigenous and local knowledge and associated issues (they may also be indigenous and local knowledge holders); and experts on indigenous and local knowledge are understood to be persons who have knowledge about indigenous and local knowledge and associated issues, not necessarily from indigenous peoples and local communities. *Source: IPBES (IPBES/5/15 2017).*

Indigenous People and Local communities (IPLC)
Indigenous peoples and local communities (IPLCs) are, typically, ethnic groups who are descended from and identify with the original inhabitants of a given region, in contrast to groups that have settled, occupied or colonized the area more recently. *Source: IPBES Glossary.*

Individual behaviour
Individual behaviour is usually understood as anything an animal or a person does in response to a particular situation or stimulus. Actions may be overt (motor or verbal) and directly measurable, or covert (activities not viewable but involving voluntary muscles) and indirectly measurable.

Institutions
Institutions are the (informal) conventions and norms, and (formal) legal rules which influence choices at all levels of society. The concept also encompasses the notions of habits and practices, referencing to the habituation of conventions and norms. Institutions structure both formal and informal interactions among people and organizations and influence human-nature relationships. As social structures, they shape how decisions are made and implemented and how responsibilities are distributed. Institutions are power-carriers as they shape people's identities and behaviour regarding particular values and interests.

- **Value-articulating institution:** Methods for valuation of nature and NCPs may be termed value articulating institutions since they are based on a set of rules concerning the valuing process:

  - Participation: who participates; in what capacity; and how.
  - What counts as data and what form it should take (prices, weights, arguments, physical measures etc.).
  - The kind of data handling procedures involved: how data is produced; and how data are compared, weighed or aggregated (Vatn, 2005).

J

Justice
Justice traditionally refers to the fair treatment of people, or 'what we owe to each other', but its scope may also be extended to include duties to other units of nature such as animals, rivers or Pachamama. *Source Chapter 1.*

- **Distributive justice:** Focuses on the allocation among stakeholders of costs and benefits, include intergenerational and intragenerational justice. *Source: Chapter 3.*

- **Ecological justice:** Non-human entities as subjects of justice (rights-holders). Rights of nature vs. rights to nature. *Source: Chapter 5.*

- **Environmental justice:** Fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (EPA, 1998). Fair treatment means that no single group of people should bear a disproportionate share of the negative environmental consequences arising from industrial, governmental, or commercial operations or policies. Meaningful involvement means that: (i) people must have the opportunity to participate in decisions about activities that may affect their

environment and/or health; (ii) the public's contribution can influence the regulatory agency's decision; (iii) the public's concerns will be considered in the decision-making process; and (iv) the decision makers must seek out and facilitate the involvement of those potentially affected (Beretta, 2012). *Source: Chapter 2.*

- **Epistemic justice:** Universal participation in terms of equality of all inquirers in access to information and knowledge (Anderson, 2012). Disputes over meaning and importance, among powerful and powerless social groups, on what knowledge counts as true, valid and important in decision-making (Fricker, 2013; Medina, 2013). The idea of epistemic injustice also relates to distributive unfairness in the distribution of epistemic or knowledge goods and services such as information or education (Coady, 2010). *Source: Chapter 2.*

- **Procedural justice:** "refers to fairness in the political processes that allocate resources and resolve disputes. It involves recognition, inclusion, representation and participation in decision-making" (McDermott *et al.*, 2013). *Source: Chapter 3.*

- **Recognition:** In social-environmental justice, recognition is about the respect for (community) ways of life, local knowledge, and cultural difference (Schlosberg, 2004). *Source: Chapter 3.*

- **Retributive justice:** Polluter pays principle, "Responsibility [...] falls more to those in a position of power to effect change, and those who have the privilege of benefiting from conservation whilst not being exposed to the corresponding costs." (Martin *et al.*, 2016). *Source: Chapter 5.*

K

Kinship-centric principle (other humans)
Actions of mutual support between humans such as sharing, gender equity, social equity, honesty, humility, modesty. Some of these elements can be revealed as relevant through valuation methods and approaches, as well as by practices associated with them. *Source: Chapter 3.*

Kinship-centric principle (non-humans)
e.g., animals, plants and spirits, and such approach forms part of an indigenous cultural identity. Maintaining reciprocal and healthy relationships through a continuum with animals, plants and the lands where they reside involve the giving and taking of resources in appropriate ways, at appropriate times. In some cases, animals and plants are seen and treated as equals to humans and shape and reshape human relations with nature. Often, the values embedded in these relationships drive human behaviour and are elicited through certain valuation methods. Appreciation (no disregard) for spiritual entities (e.g., sacred mountains, rivers, among others) residing on ancestral lands, can be an example of a Kinship-central approach (focused on non-humans). *Source: Chapter 3.*

Knowledge (systems)
Indigenous and local knowledge systems are understood to be dynamic bodies of integrated, holistic, social and ecological understandings, know-hows, practices and beliefs pertaining to the relationship of living beings, including people, with one another and with their environment. Indigenous and local knowledge is grounded in territory, is highly diverse and is continuously evolving through the interaction of experiences, skills, innovations and different types of wisdom expressed in multiple ways (written, oral, visual, tacit, practical and scientific). Such knowledge can provide information, methods, theory and practice for sustainable ecosystem management. Indigenous and local knowledge systems have been, and continue to be, empirically tested, applied, contested and validated through different means in different contexts. Western Academic knowledge systems relate to often explicit knowledge that has been derived from applying formal methods in academic or technical institutions. *Source: Chapter 2.*

L

Life frames of nature's values (LFs or life frames)
Frames that illustrate the ways in which people conceptualise how nature matters. Life frames mediate between ways of being/living and the prioritization of different sets of broad and specific values. The four archetypes of *living from, living in, living with* and *living as* nature are not mutually exclusive. They offer a range of sources-of-concern for nature that can overlap or be emphasized in diverse contexts. *Source: Chapter 2.*

M

Motivation
One's general willingness to do something. It is the set of psychological forces that compel you to take action. Motivation can be extrinsic – based on changes in external conditions, e.g., external rewards. Intrinsic motivation refers to an inherent drive to seek out challenges and new possibilities. *Source: Chapter 2.*

Motivation crowding
Providing extrinsic incentives for certain kinds of behaviour – such as promising monetary rewards for accomplishing more of intrinsically/ normatively motivated action – can undermine that motivation for performing the behaviour, diminished motivation to act. *Source: Chapter 2.*

N

Norms
Norms are rules about what is accepted behaviour (Lapinski & Rimal, 2005). They are supporting underlying values as defined by a society. They are therefore 'ought to' statements defining what one may or may not do (Hitlin & Piliavin, 2004). Examples are rules about care for nature and what is just treatment of others.

P

Pathways
In the context of the IPBES global assessment, trajectories toward the achievement of goals and targets for biodiversity conservation, the management of nature and nature's contributions to people, and, more broadly, the UN 2030 Sustainable Development Goals (IPBES, 2019).

Policy
A definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions. *Source: IPBES Glossary.*

Policy instrument
Policy instruments are understood as the different interventions (formal rules, laws, social norms and processes etc.) made by decision-makers (governments and public authorities, intergovernmental organizations, companies etc.) to ensure that (public) policy objectives are supported and achieved by influencing the behaviour

of other stakeholders (Bemelmans-Videc *et al*., 2011; Persson, 2006). The IPBES Catalogue differentiates among four different types of policy instruments: i) economic and financial instruments (financial incentives handling out or taking away economic resources), ii) legal and regulatory instruments (formal rules, laws and regulations), iii) rights-based instruments and customary norms (including human and collective rights as well as customary norms and institutions of indigenous people), and iv) social and cultural instruments (information-based instruments and voluntary or collective actions with an emphasis on the intertwined relationships between ecosystems and sociocultural dynamics). *Source: Chapter 6.*

Policy-cycle
Policies are often cyclical in that emerging problems are addressed with the formulation of policies, followed by their implementation and subsequent evaluation. These stages in the policy cycle can be formalized with assigned roles and processes, and consist of many other sub-stages. For example, the policy formulation stage can include problem definition, identification of alternatives, consultations and public hearings, and finally, a decision on the chosen policy. Implementation can include allocating budgetary, assigning implementation roles to different actors, setting specific targets, and possibly developing guidelines. The evaluation and redefinition of the problem can be conducted with the help of formal monitoring systems as a periodic exercise, or it can be an ad-hoc process or a mere societal discussion of the impacts and consequences of existing policies.
Source: IPBES Glossary.

Policy-support tools and methodologies
Approaches and techniques based on science and other knowledge systems, including indigenous and local knowledge, that can inform, assist and enhance relevant decisions, policy making and implementation at local, national, regional and global levels to protect nature, thereby promoting nature's contributions to people and a good quality of life (IPBES_4_INF_14, n.d.). *Source: IPBES Glossary.*

Power
Power is the capacity of actors to mobilize agency, resources, and discourses, as well as to utilize or shape institutions to achieve a goal. Power can be both constraining and enabling, and the capacity of one actor can inhibit the capacity of another actor. Power in the context of human-nature relationships can be manifested in multiple and non-exclusive ways through discourses and social structures. Discursive power is the power to use discourses or knowledge production to shape worldviews, identities, and values. Related to discursive power is the power to frame how issues are understood, communicated, and discussed (framing power). Structural power is the result of historically-specific socio-cultural, political, and economic systems that reproduce social positions and/or hierarchies among social groups. Structural power relations determine, for example, who has the power to make rules regarding access, use, and responsibilities about nature/NCP, and who is excluded from this process (rule-making power); as well who has the formal or informal rights regarding nature/NCP which in turn determines the use of these assets and whose values are emphasized (operational power). *Source: Chapter 4.*

Practice
A customary action, habit, or behaviour; a manner or routine. *Source: Chapter 3.*

Preferences
They denote *stated* or *revealed choices* of one or more alternatives over others and can be expressed in economic or sociocultural terms. Despite being considering synonyms for value in some disciplines (e.g., economics), preferences should be understood as rankings of possible outcomes in terms of their specific value to people (e.g., preferences related to health and good quality of life). *Source: Chapter 2.*

Q

Quality of life (Good quality of life)
Within the context of the IPBES Conceptual Framework – good quality of life refers to the achievement of a fulfilled life, a notion which may vary significantly across societies and cultures. There is a common understanding that quality of life is composed of both shared common aspects across cultures (e.g., food security) and contextual aspects (e.g., self-determination), which can be assessed objectively (e.g., caloric intake) or subjectively (e.g., life satisfaction) applying quantitative and qualitative indicators. Good quality of life is generally portrayed through material conditions (e.g., level of food availability) as well as through individual aspirations (e.g., personal; professional; spiritual) and capabilities (e.g., education) for people to live in accordance to what they themselves consider to be "a good life", which can differ across cultures, contexts and individuals. The role of nature in achieving a good quality of life is complex and heterogeneous, and depends on the social-ecological context, and on the way people portray themselves in relation to nature. *Source: Chapter 1 building on IPBES definition.*

R

Respect (towards nature)
This respect is expressed in/identified through ceremonies, rituals, actions in sacred sites whose purpose is to renew a sense of thankfulness and reverence/deep respect to the land or the sea (terrestrial or marine landscape) or to their components. *Source: Chapter 3.*

Responsibility/care for the land
This is about integrity of ancestral territory leadership in caring for nature. Actions and behaviours that minimize or prohibit exploitative use of materials, no waste resources philosophies, awareness about sustainability for the future generations; and preservation of cultural knowledge (ancestor heritage). IPLCs and cultural identities are strongly connected to their lands (and seascapes). Their values often emerge in relation to their context and can become visible through issues related to the integrity of ancestral territory, leadership in caring for nature, actions and behaviours that minimize or prohibit exploitative use of materials within their lands or in other geographical terrains. A philosophy of zero waste of resources is enacted while thinking about the health and the future of the land (and sea), awareness about sustainability of the land (and sea) for the future generations; and preservation of cultural knowledge (ancestral heritage). *Source: Chapter 3.*

Rightholder
A group of people (a community and its individual members), with a common identity and a shared set of rules, who rightfully has title over their territory and the natural resources belonging to it. Being a right holder implies that the group's wellbeing is promoted by the right, and that the group (and its individual members) have the capacity to exercise their self-determination related to the given territory. From an Indigenous perspective, Right holder refers to the collective rights

and entitlements of Indigenous peoples, a group of people, and a community including all individual members, with a shared cosmovision/worldview, identity, beliefs, values, and ethics. They have inherent collective rights over their territories and natural resources. Implicit in having a "right holder" status implies that the holder of it promotes the group's well-being and can exercise their self-determination related to the given territory (Kolers, 2012; UNDRIP, 2020; Wenar, 2005).

S

Scenarios
Scenarios are representations of different possible futures from a defined starting point (IPBES, 2016; Mahmoud *et al*., 2009). They are focused on highlighting or exploring drivers of change and the impacts of changes in these over a specified time frame. In doing so they enable decision-makers to anticipate potential changes and develop timely responses to these (Mahmoud *et al*., 2009). *Source: Chapter 5.*

Shared values
Shared values are the broad and specific values that people express collectively, in groups, communities, and across society as a whole. They can be formed through long-term processes of socialisation and shorter-term processes such as group deliberations. *Source: Chapter 2.*

Social values
Social values refer to value indicators at a social scale, such as social willingness to pay in economics. They can be established by aggregation from individual values through analytical procedures, or through social processes, such as deliberative valuation, that lead to shared social values. *Source: Chapter 2.*

Social behaviour
Defined as interactions among individuals, normally within the same species, that are usually beneficial to one or more of the individuals. It is believed that social behaviour evolved because it was beneficial to those who engaged in it, which means that these individuals were more likely to survive and reproduce. Social behaviour serves many purposes and is exhibited by an extraordinary wide variety of animals, including invertebrates, fish, birds, and mammals. Thus, social behaviour is not only displayed by animals possessing well-developed brains and nervous systems. *Source: Chapter 5.*

Social construction
Emphasizes that social/cultural processes behind the creation of artefacts, values and institutions. To the extent that these constructs influence people's identity and personality, one talks of social construction of the human. *Source: Chapter 2.*

Social learning
Social learning is both the cooperation of partners and the outcome of this cooperation that occurs most efficiently through joint problem solving and reflection within learning networks (Berkes, 2009) can be reinforced by experiences (Bandura, 1971). *Source: Chapter 6.*

Social values
Social values refer to value indicators at a social scale, such as social willingness to pay in economics. They can be established by aggregation from individual values through analytical procedures, or through social processes, such as deliberative valuation, that lead to shared social values. *Source: Chapter 2.*

Stakeholder
Actors that are involved in decision making processes and implementation, either as influencing the decision-making process, or as being dependent on, and therefore facing the consequences of, the decisions (including Public, private and civil society actors). For the values assessment, 13 stakeholder groups have been identified that can be categorised in three categories: Influencers, affected actors and key players (See section 6.1.2.2).

Sustainability
Understandings of sustainability are diverse and deeply rooted in different cultural contexts. For some, sustainability emphasizes the need for maintaining biodiversity and life support functions on the planet. For others, sustainability refers to maintaining nature's contributions to people that enhance people's livelihoods and quality of life. Sustainability can also entail maintaining or managing landscapes as well as relations of connectedness and reciprocity with nature. In the context of the globally agreed sustainable development goals, sustainability refers to an emergent outcome or property of such sustainable development, whereby trajectories of change stay within critical social-ecological thresholds, and in which current and future generations everywhere have the ability to meet their human needs, rights and aspirations. *Source: Chapter 1.*

T

Trade-offs
A trade-off is a situation where an improvement in the status of one aspect of the environment or of human well-being is necessarily associated with a decline in or loss of a different aspect. Trade-offs characterize most complex systems and are important to consider when making decisions that aim to improve environmental and/or socio-economic outcomes. Trade-offs are distinct from synergies (the latter are also referred to as "win-win" scenarios): synergies arise when the enhancement of one desirable outcome leads to enhancement of another. Adapted from (Raudsepp-Hearne *et al*., 2010) and (Daw *et al*., 2015). *Source: IPBES Glossary.*

Transformative change
The IPBES Global Assessment defines transformative change as 'a fundamental, system-wide reorganisation across technological, economic and social factors, including paradigms, goals and values'. We build on this definition through reference to the depth, breadth and dynamics of system reorganisation. Depth refers to change that goes beyond addressing the symptoms of environmental change or their proximate drivers, such as new technologies, incentive systems or protected areas, to include changes to underlying drivers, including consumption preferences, beliefs, ideologies and social inequalities (IPBES, 2019; Patterson *et al*., 2017; Scoones *et al*., 2015). Breadth refers to change across multiple spheres, with emerging consensus that transformation requires co-evolutionary change across different spheres of society, including personal, economic, political, institutional and technological ones (Harvey, 2010; O'Brien & Sygna, 2013; Pelling *et al*., 2015; Temper *et al*., 2018; Westley *et al*., 2011). Dynamics and processes refer to the emergent patterns of change across 'depths', 'breadths' and time that unfold as non-linear pathways. These may be characterised by 'punctuated equilibrium' in which more stable periods of incremental change are punctuated by bursts of change in which underlying structures are reorganised into new states (Patterson *et al*., 2017; Westley *et al*., 2011). *Source: Chapter 5 FOD based on IPBES Global Assessment.*

P

Pathways
"Pathways" consist of descriptions of different strategies for moving from the current situation towards a desired future vision or set of specified targets. They are descriptions of purposive courses of actions that build on each other, from short-term to long-term actions into broader transformation. They are closely related to normative or policy or target-seeking scenarios. *Source: ECA assessment, proposed by Chapter 5.*

V

Valuation
It is the process of documenting the existence of values, identifying when, where and by whom they are expressed, that in turn allows characterizing values. Valuation of nature can inform decision-making about numerous human-nature relationships; it can support decision processes about alternative projects or policies, inform the design of policy tools and instruments, for conservation and sustainable management of nature or to improve justice. Outside the formal policy space, valuation is also undertaken by academia, the private sector, non-governmental organizations and by indigenous and local communities (IPLC). IPLC undertake valuation not only to make decisions about nature, but also to assess their relationships with nature, to plan collectively, resolve conflicts, defend their territories, and as a means for strengthening and reciprocating their connections with nature. *Source: Chapter 3.*

Valuation approach
Valuation approaches are higher level assumptions, ideas or beliefs that underpin methods. They translate key decisions on how a method is to be applied or how the information generated by methods is to be interpreted. For each approach there are often multiple accepted methods that adhere to the basic assumptions and ideas of the given approach. Valuation approaches can also be manifested as "traditions" or widely accepted and expected protocols for undertaking valuation. Valuation traditions are heavily informed and influenced by the cultural context and/or epistemological worldviews. *Source: Chapter 3.*

Valuation methods
Are the specific techniques and accepted formal procedures that are applied to gather and analyse information from nature and society in order to and understand or make explicit the state of nature and its importance to people a) quantity, quality and status of nature including its spatial and temporal variations; b) the relevance or importance of nature to people and societies; and c) the nature of human-nature and nature-human relations in terms of how people and societies embed and live out their values of nature (as actions, principles, worldviews or philosophies). *Source: Chapter 3.*

Values
Values reflect life goals, beliefs and general guiding principles. They also reflect the opinions or judgements of the importance of specific things in particular situations and contexts. When considering the values of nature, values can refer to nature itself, how nature contributes to people's quality of life, in addition to the way people express the value of life-supporting processes, functions, and systems – interrelating biophysical, spiritual, or symbolic aspects. Within the assessment we refer to broad, specific values and value indicators; as well as to instrumental, intrinsic and relational values. *Source: Chapters 1 and 2.*

- **Broad values:** They refer to life goals, general guiding principles and orientations towards the world that are informed by people's beliefs and worldviews (Dietz *et al*., 2005). Broad values include moral principles, such as justice, belonging, freedom, but also life goals, like enjoyment, health, prosperity. Broad values influence specific values and provide them with a general context and meaning. *Source: Chapter 1.*

- **Specific values:** Specific values of nature are opinions or judgments regarding the importance of nature in a particular situation or context. Specific values can be grouped into three types: instrumental, intrinsic and relational values. *Source: Chapter 2.*

- **Value indicators:** Indicators of value are quantitative and qualitative measures of the importance of nature to people. Indicators used to express the value of nature can be biophysical, economic and socio-cultural. *Source: Chapter 2.*

- **Instrumental value:** Instrumental values, which relate to things that are a means to a desired or valued end or satisfy people's preferences, are the most commonly reported value type in environmental policy documents. They are generally associated with nature as an asset, capital or resource and are strongly related to the concept of ecosystem services. *Source: Chapter 2.*

- **Intrinsic value:** Intrinsic values relate to the values of nature expressed independently of any reference to humans as valuers and include entities such as a habitat or species that are worth protecting as ends in-and-of themselves. They are consistent with biocentric worldviews and with the understanding of values as existing objectively in nature. *Source: Chapter 2.*

- **Relational value:** Relational values refer to the importance of desirable, meaningful, and often reciprocal relationships – beyond means to an end – between humans and nature, and among humans (including across generations) through nature (e.g., sense of place, spirituality, responsibility, care, reciprocity, stewardship). *Source: Chapter 2.*

- **Diverse values:** Diverse values arise from the different lenses through which people interpret human-nature relationships (i.e., worldviews), and as a result, diverse values have had different meanings across disciplines, knowledge systems, cultures, languages and social-ecological contexts. This assessment focuses on the diverse values of nature which emerge from the different ways in which people perceive nature and build their relations with it. *Source: Chapter 1.*

- **Value formation:** 'Value formation' refers to how values develop in the first place. It can occur in individual-focused processes, trough socially-oriented processes or in social-ecological processes that do not separate humans and nature. *Source: Chapter 2.*

- **Value expression:** Values can be expressed explicitly through language and implicitly through actions like choices, decisions made, everyday practices or rituals. Valuation methods are used to undertake explicit valuation. Methods and approaches to integrate and bridge values, provide knowledge about nature's values as input to decision-making. *Source: Chapter 2.*

- **Value change:** Value change refers to the modification of people's values or of the prioritization of their values in particular contexts. Value change processes occur at different social scales, from large-scale cultural shifts (e.g., intergenerational shifts due to changing demography or changes to shared values) to small-scale personal shifts (e.g., values formation and change over an individual's lifetime). Individual, social and social-ecological experiences and interactions influence value change; examples include formal and informal education, social practices, group conformation processes, personal experiences and shocks, and social-ecological events (e.g., natural disasters, pandemics). *Source: Chapter 5.*

- **Value monism:** Derives from a utilitarian perspective on human-nature relationships which privileges some values of nature over others (usually monetary values). *Source: Chapter 2.*

- **Values of nature:** The values of nature encompass the different layers of the values typology, including worldviews (and underpinning knowledge systems, languages and cultures), broad values, specific values, indicators and preferences. In addition to instrumental values, the values of nature include reciprocal values and perspectives of nature where nature and people are not seen as separate, and where intrinsic values are acknowledged on a par with values of nature's benefits to people. *Source: Chapter 1.*

- **Value pluralism:** Value pluralism is the idea that there are several values which may be equally correct and fundamental, and yet in conflict with each other. It is the opposite of value monism. More broadly speaking, value pluralism may also refer to different people having different worldviews and hence different values. In addition, these plural values may be incommensurable (i.e., they do not share a single unit of measurement, a single metric, and that there is no objective way of comparing them or weighting them against each other). *Source: Chapter 3.*

Values of nature
When referring to values of 'nature', we expand on the concept proposed by Díaz *et al.* (2015) by recognizing that individual and group understandings of nature are socially constructed, and that different social groups have different conceptualizations of the relationship between the human and non-human world. For IPBES, nature refers loosely to the non-human living world including the scientific categories of biodiversity, ecosystem structure and functioning, evolution, the biosphere, humankind's shared evolutionary heritage and biocultural diversity. In addition, IPBES recognises other worldviews, including those from IPLCs, in which people recognize the diverse entities and elements of nature such as rivers, mountains, plants, animal species, existing within the planet denoted by categories like Mother Earth and systems of life (Coscieme *et al*., 2020). Among many IPLCs, nature is often viewed as inextricably linked to humans, not as a separate entity. By recognizing this wide understanding of the concept 'nature', we are then able to recognize the diversity of values that emerges within these different ways of seeing the world. *Source: Chapter 1.*

Valuing
Is the more implicit act of assigning a value to something, which, in contrast to valuation, does not necessarily follow an explicit and formal process. Thus, while we all go through the process of 'valuing' on a daily basis for our day-to-day decisions, valuation is most often an exercise that is undertaken by 'experts' or a specifically designed team systematically applying a specific method. *Source: Chapter 1.*

Visions (of the future)
"Visions" are descriptions of a desirable future (an endpoint in time), which society or parts of society want to achieve. They usually consist of statements depicting orienting goals, and the assumptions, beliefs and paradigms that underlie the desired future. Visions can take the form of policy targets, but can also be formulated by a range of actors, e.g., from the private sector to address business targets or civil society to address social targets. *Source: ECA assessment, proposed by Chapter 5.*

W

Worldviews
Mental lenses through which humans social groups perceive, think about, interpret, inhabit and modify the world. Rooted in *cultural traditions*, they shape and are shaped by *knowledge systems*, *languages* and *values*. *Epistemic* worldviews pertain to diverse knowledge systems that hold often implicit philosophical assumptions about how nature and values can be known, while *human-nature* worldviews guide perspectives on our conceptualization of and relationship with nature based on underlying value systems. *Source: Chapter 2.*

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ANNEX II
List of authors and review editors

Co-chairs

Patricia Balvanera
Chair
Instituto de Investigaciones en Ecosistemas y Sustentabilidad (IIES),
Universidad Nacional Autónoma de México
Mexico

Unai Pascual
Chair
Basque Centre for Climate Change (BC3)/
Ikerbasque Basque Foundation for Science/
Centre for Development and Environment,
University of Bern
Spain/Switzerland

Michael Christie
Chair
Aberystwyth Business School,
Aberystwyth University
United Kingdom of Great Britain and Northern Ireland

Brigitte Baptiste
Chair
EAN University
Colombia

Chapter 1

Patricia Balvanera
Chair
Instituto de Investigaciones en Ecosistemas y Sustentabilidad (IIES),
Universidad Nacional Autónoma de México
Mexico

Unai Pascual
Chair
Basque Centre for Climate Change (BC3)/
Ikerbasque Basque Foundation for Science/
Centre for Development and Environment,
University of Bern
Spain/Switzerland

Michael Christie
Chair
Aberystwyth Business School,
Aberystwyth University
United Kingdom of Great Britain and Northern Ireland

Brigitte Baptiste
Chair
EAN University
Colombia

Christopher B. Anderson
Lead Author
Instituto de Ciencias Polares, Ambiente y Recursos Naturales, Universidad Nacional de Tierra del Fuego /
Centro Austral de Investigaciones Científicas,
Consejo Nacional de Investigaciones Científicas y Técnicas Argentina,
United States of America/
Argentina

Simone Athayde
Lead Author
Florida International University (FIU)/
University of Florida (UF)/
Federal University of Tocantins (UFT)
Brazil/United States of America

David N. Barton
Coordinating lead author
Norwegian Institute for Nature Research (NINA)
Norway, United Kingdom of Great Britain and Northern Ireland/Norway

Rebecca Chaplin-Kramer
Coordinating lead author
Natural Capital Project, Stanford University /
Institute on the Environment,
University of Minnesota
United States of America

Sander Jacobs
Coordinating lead authors
Research institute for Nature and Forest INBO/
Belgian Biodiversity Platform
Belgium

Eszter Kelemen
Coordinating lead author
ESSRG Nonprofit Kft
Hungary

Ritesh Kumar
Lead Author
Wetlands International South Asia
India/Wetlands International

Elena Lazos Chavero
Coordinating lead author
Instituto de Investigaciones Sociales,
Universidad Nacional Autónoma de México
Mexico

Adrian Martin
Lead Author
School of International Development,
University of East Anglia
United Kingdom of Great Britain and Northern Ireland

Tuyeni H. Mwampamba
Lead Author
Instituto de Investigaciones en Ecosistemas y Sustentabilidad (IIES),
Universidad Nacional Autónoma de México

Barbara Nakangu
Lead Author
World Wildlife Fund Netherlands
Uganda/World Wildlife Fund

Patrick O'Farrell
Lead Author
Zebra Studios/
Fitzpatrick Institute of African Ornithology, DST/NRF Centre of Excellence,
Department of Biological Sciences,
University of Cape Town
South Africa

Christopher M. Raymond
Coordinating Lead Author
Helsinki Institute for Sustainability Science (HELSUS), University of Helsinki/
Ecosystems and Environment Research Program, Faculty of Biological and

Environmental Sciences, University of Helsinki/
Department of Economics and Management, Faculty of Agriculture and Forestry,
University of Helsinki Australia, Netherlands/Sweden, Finland

Suneetha M Subramanian
Lead Author
United Nations University- Institute for the Advanced Study of Sustainability India/
United Nations University Institute for the Advanced Study of Sustainability

Mette Termansen
Lead Author
Department of Food and Resource Economics (IFRO), University of Copenhagen
Denmark

Meine van Noordwijk
Lead Author
World Agroforestry (ICRAF)/
Wageningen University and Research/
Agroforestry research group,
Brawijaya University
Netherlands/Indonesia

Arild Vatn
Coordinating Lead Author
Department of Environment and Development Studies/
Faculty of Landscape and Society
Norwegian University of Life Sciences
Norway

Hebe Vessuri
Review editor
Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)/ Centro de Investigaciones en Geografía Ambiental, Universidad Nacional Autónoma de México
Bolivarian Republic of Venezuela

Robert T. Watson
Review editor
Emeritus professor at the University of East Anglia
United Kingdom of Great Britain and Northern Ireland

Bosco Lliso
Fellow
Basque Centre for Climate Change (BC3)
Spain

Ana Sofia Monroy-Sais
Fellow
Centro de Investigaciones en Geografía Ambiental,
Universidad Nacional Autónoma de México
Mexico

Chapter 2

Christopher B. Anderson
Lead Author
Instituto de Ciencias Polares, Ambiente y Recursos Naturales,
Universidad Nacional de Tierra del Fuego / Centro Austral de Investigaciones Científicas, Consejo Nacional de Investigaciones Científicas y Técnicas
Argentina, United States of America/
Argentina

Simone Athayde
Lead Author
Florida International University (FIU)/
University of Florida (UF)/
Federal University of Tocantins (UFT)
Brazil/United States of America

Christopher M. Raymond
Coordinating Lead Author
Helsinki Institute for Sustainability Science (HELSUS), University of Helsinki/
Ecosystems and Environment Research Program, Faculty of Biological and Environmental Sciences, University of Helsinki/
Department of Economics and Management, Faculty of Agriculture and Forestry, University of Helsinki
Australia, Netherlands/Sweden, Finland

Arild Vatn
Coordinating Lead Author
Department of Environment and Development Studies, Faculty of Landscape and Society
Norwegian University of Life Sciences
Norway

Paola Arias-Arevalo
Lead author
Facultad de Ciencias Sociales y Económicas, Universidad del Valle
Colombia

Rachelle K. Gould
Lead author
University of Vermont/
Gund Institute for the Environment
United States of America

Jasper Kenter
Lead author
Ecologos Research Ltd, Aberystwyth/
Department of Environment and Geography, University of York
Netherlands/ United Kingdom of Great Britain and Northern Ireland

Barbara Muraca
Lead author
University of Oregon, Department of Philosophy and Environmental Studies Program
Italy/United States of America

Sonya Sachdeva
Lead author
USDA Forest Service,
Northern Research Station
United States of America

Aibek Samakov
Lead author
Aigine Cultural Research Center/
Eberhard Karl University of Tübingen,
Kyrgyzstan

Eglee Zent
Lead author
Instituto Venezolano de Investigaciones Científicas, Laboratorio de Ecología Humana
Bolivarian Republic of Venezuela

Kai Chan
Review editor
University of British Columbia
Canada

Dominic Lenzi
Fellow
Mercator Research Institute on Global Commons and Climate Change (MCC)
Australia, Italy/Netherlands

Ranjini Murali
Fellow
The Snow Leopard Trust/
Humboldt University
India

Ariane Amin
Fellow
Université Félix Houphouet Boigny d'Abidjan (UFHB)/
Centre Suisse de Recherche Scientifique en Côte d'Ivoire (CSRS)
Côte d'Ivoire

Chapter 3

Mette Termansen
Coordinating lead authors
Department of Food and Resource Economics (IFRO), University of Copenhagen
Denmark

Sander Jacobs
Coordinating lead authors
Research institute for Nature and Forest INBO/ Belgian Biodiversity Platform
Belgium

Tuyeni H. Mwampamba
Coordinating lead authors
Instituto de Investigaciones en Ecosistemas y Sustentabilidad (IIES), Universidad Nacional Autónoma de México
United Republic of Tanzania/Mexico

SoEun Ahn
Lead author
Korea Environment Institute
Republic of Korea

Antonio J. Castro Martinez
Lead author
Department of Biology and Geology, University of Almeria
Spain

Nicolas Dendoncker
Lead author
Department of Geography, Transition Institute, Institute of Life Earth and Environment, University of Namur
Belgium

Houda Ghazi
Lead author
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
Morocco

Haripriya Gundimeda
Lead author
Department of Humanities and Social Sciences, Indian Institute of Technology Bombay
India

Mariaelena Huambachano
Lead author
Syracuse University
Peru, New Zealand/ United States of America

Heera Lee
Lead author
Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research, Atmospheric Environmental Research (IMK-IFU)
Republic of Korea/Germany

Nibedita Mukherjee
Lead author
Department of Social and Political Sciences, CBASS, Brunel University
India/United Kingdom of Great Britain and Northern Ireland

Gabriel Ricardo Nemoga
Lead author
University of Winnipeg/
Universidad Nacional de Colombia, Grupo de Investigación Política y Legislación sobre Biodiversidad, Recursos Genéticos y Conocimiento Tradicional (PLEBIO)
Colombia/Canada

Jonas Ngouhouo Poufoun
Lead author
International Institute of Tropical Agriculture (IITA)/
Congo Basin Institute (CBI)
Cameroon/France

Ignacio Palomo
Lead author
University of Grenoble Alpes, IRD, CNRS
Spain

Ram Pandit
Lead author
University of Western Australia, UWA School of Agriculture and Environment/
Hokkaido University, Global Center for Food, Land and Water Resources, Research Faculty of Agriculture
Nepal/Australia

Marije Schaafsma
Lead author
School of Geography and Environmental Science, University of Southampton/
Institute for Environmental Studies, Vrije Universiteit Amsterdam
Netherlands/ United Kingdom of Great Britain and Northern Ireland

Andy Choi
Lead author
National Institute for Ecology
Republic of Korea

Joshua Farley
Review editor
University of Vermont, Department of Community Development and Applied Economics and Fellow at the Gund Institute for Environment
United States of America

Ernesto Raéz
Review editor
Universidad Antonio Ruiz de Montoya
Peru

Anna Filyushkina
Fellow
Department of Ecology, Swedish University of Agricultural Sciences/
Institute for Environmental Studies, Vrije Universiteit Amsterdam
Russian Federation

Marcello Hernández-Blanco
Fellow
Independent scholar
Costa Rica

Chapter 4

David N. Barton
Coordinating lead author
Norwegian Institute for Nature Research (NINA)
Norway, United Kingdom of Great Britain and Northern Ireland/Norway

Rebecca Chaplin-Kramer
Coordinating lead author
Natural Capital Project, Stanford University/ Institute on the Environment, University of Minnesota
United States of America

Elena Lazos Chavero
Coordinating lead author
Instituto de Investigaciones Sociales, Universidad Nacional Autónoma de México
Mexico

Meine van Noordwijk
Coordinating lead author
World Agroforestry (ICRAF)/
Wageningen University and Research/ Agroforestry research group, Brawijaya University
Netherlands/Indonesia

Stefanie Engel
Lead author
Osnabruck University, School of Business Administration and Economics
Germany

Alexander Girvan
Lead author
The Cropper Foundation
Jamaica

Thomas Hahn
Lead author
Stockholm Resilience Centre, Stockholm University
Sweden

Beria Leimona
Lead author
World Agroforestry (ICRAF)
Indonesia

Sharachchandra Lele
Lead author
Centre for Environment & Development, Ashoka Trust for Research in Ecology and the Environment
India

Roldan Muradian
Lead author
Universidade Federal Fluminense
Netherlands/Brazil

Aidin Niamir
Lead author
Senckenberg Society for Nature Research
Islamic Republic of Iran/Germany

Begüm Özkaynak
Lead author
Boğaziçi University
Türkiye

Agnieszka Pawlowska-Mainville
Lead author
University of Northern British Columbia (UNBC)
Canada, Poland/Canada

Paula Ungar
Lead author
Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Bogotá, Colombia
Colombia

Juan Camilo Cárdenas
Review editor
University of Massachusetts Amherst/ Universidad de los Andes
Colombia

Susan Baker
Review editor
Cardiff University
United Kingdom of Great Britain and Northern Ireland

Sara Nelson
Fellow
University of British Columbia (UBC)
United States of America/Canada

Cem İskender Aydin
Lead author
Boğaziçi University
Türkiye

Pricila Iranah
Lead author
Department of Fish, Wildlife and Conservation Biology, Colorado State University/
Department of Biology, University of Nebraska at Kearney
Mauritius/United States of America

Chapter 5

Adrian Martin
Coordinating lead author
School of International Development, University of East Anglia
United Kingdom of Great Britain and Northern Ireland

Patrick O'Farrell
Coordinating lead author
Zebra Studios, Cape Town/
Fitzpatrick Institute of African Ornithology, DST/
NRF Centre of Excellence,
Department of Biological Sciences, University of Cape Town
South Africa

Ritesh Kumar
Coordinating lead author
Wetlands International South Asia
India/Wetlands International

Uta Eser
Lead author
Office for Environmental Ethics, Tübingen University
Germany

Daniel P. Faith
Lead author
The University of Sydney
Australia

Erik Gomez-Baggethun
Lead author
Department of International Environment and Development Studies, Norwegian University of Life Sciences/
Norwegian Institute of Nature Research
Norway

Zuzana Harmackova
Lead author
Global Change Research Institute of the Czech Academy of Sciences, CzechGlobe/
Stockholm Resilience Centre
Czech Republic

Andra-Ioana Horcea-Milcu
Lead author
Babeş-Bolyai University in Cluj-Napoca (BBU)/
University of Helsinki
Romania

Juliana Merçon
Lead author
Instituto de Investigaciones en Educación, Universidad Veracruzana
Brazil

Martin Quaas
Lead author
German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig
Germany

Julian Rode
Lead author
Helmholtz-Centre for Environmental Research (UFZ)
Germany

Ricardo Rozzi
Lead author
Cape Horn International Center (CHIC), Universidad de Magallanes, Puerto Williams/
Chile & Sub-Antarctic Biocultural Conservation Program, Department of Biological Sciences and Department of Philosophy and Religion, University of North Texas
Chile/United States of America

Nadia Sitas
Lead author
Centre for Sustainability Transitions, Stellenbosch University
South Africa

Yuki Yoshida
Lead author
National Institute for Environmental Studies
Japan

Tobias Nyumba Ochieng
Lead author
Department of Environment and Geography, University of York/
Institute for Climate Change and Adaptation, University of Nairobi/
African Conservation Centre
Kenya

Laura Pereira
Review editor
Global Change Institute, University of the Witwatersrand/
Stockholm Resilience Centre, Stockholm University
South Africa

Chuks Okereke
Review editor
Centre for Climate Change and Development, Alex Ekwueme Federal University/
Environment Development, University of Reading
Nigeria

Ann-Kathrin Koessler
Fellow
School of Business Administration and Economics/
Institute of Environmental Systems Science, Osnabrück University
Germany

Natalia Lutti
Fellow
Centro de Estudos em Sustentabilidade, Escola de Administração de Empresas de São Paulo da Fundação Getulio Vargas (FGV)
Brazil

Lelani Mannetti
Fellow
Urban Studies Institute, Andrew Young School of Policy Studies, Georgia State University
Namibia

Chapter 6

Eszter Kelemen
Coordinating lead author
ESSRG Nonprofit Kft.,
Hungary

Suneetha M. Subramanian
Coordinating lead author
United Nations University- Institute for the Advanced Study of Sustainability
India/ United Nations University Institute for the Advanced Study of Sustainability

Barbara Nakangu
Coordinating lead author
World Wildlife Fund Netherlands
Uganda/World Wildlife Fund

Mine Islar
Lead author
Lund University, Center for Sustainability Studies
Türkiye/Sweden

Marina Kosmus
Lead author
Deutsche Gesellschaft für Internationale Zusammenarbeit GIZ
Argentina/Germany

Emmanuel Nuesiri
Lead author
African Leadership University (ALU)
Cameroon/Nigeria

Luciana Porter-Bolland
Lead author
Red de Ecologia Funcional, Instituto de Ecologia, A.C.
Mexico

Alta De Vos
Lead author
Department of Environmental Science, Rhodes University
South Africa

Simon Anderson
Review editor
International Institute for Environment and Development
United Kingdom of Great Britain and Northern Ireland

Joji Cariño
Review editor
International Institute for Environment and Development
Philippines

Sacha Amaruzaman
Fellow
The University of Adelaide
Indonesia

Evonne Yiu
Fellow
Ernst and Young
Singapore

Multidisciplinary Expert Panel (MEP) / Bureau

Bibiana Vilá
MEP task force/expert group member
CONICET: National Research Council
Argentina

Antonio Díaz-de-León
MEP task force/expert group member
Innovative Cutting Edge Solutions (ICES)
Mexico

Mariteuw Chimere Diaw
MEP task force/expert group member
African Model Forests Network (AMFN) Secretariat
Cameroon

Mersudin Avdibegovic
MEP task force/expert group member
University of Sarajevo
Bosnia and Herzegovina

Julia Marton-Lefevre
Bureau task force/expert group member
Independent advisor
France

Rashad Allahverdiyev
Bureau task force/expert group member
Khazar University
Republic of Azerbaijan

IPBES Secretariat

Anne Larigauderie
IPBES Secretariat

Technical Support Unit

David González-Jiménez
Head
IPBES Secretariat, Technical Support Unit on Values
Mexico

Mariana Cantú
Project Official
IPBES Secretariat, Technical Support Unit on Values
Mexico

Gabriela Arroyo
Project Official
IPBES Secretariat, Technical Support Unit on Values
Mexico

Victoria Contreras
Project Official
IPBES Secretariat, Technical Support Unit on Values
Mexico

Louise Guibrunet
Project Official
IPBES Secretariat, Technical Support Unit on Values
Mexico

ANNEX III
List of expert reviewers

Expert reviewers of the IPBES assessment of the diverse values and valuation of nature

We would like to thank all of the IPBES Multidisciplinary Expert Panel members and the Bureau – both past and current – for submitting comments during the internal and external expert review stages.

All of the following expert reviewers listed below that directly participated in the assessment of the diverse values and valuation of nature as authors submitted comments on chapters to which they were not involved.

We would like to acknowledge the following governments (including the national focal point) for submitting comments on the IPBES assessment of the diverse values and valuation of nature:

- **Government of Antigua and Barbuda**
- **Government of Argentina**
- **Government of Armenia**
- **Government of Australia**
- **Government of Belgium**
- **Government of Brazil**
- **Government of Bulgaria**
- **Government of Canada**
- **Government of China**
- **Government of Estonia**
- **Government of Finland**
- **Government of France**
- **Government of Germany**
- **Government of Ghana**
- **Government of India**
- **Government of Iran**
- **Government of Japan**
- **Government of Mexico**
- **Government of Morocco**
- **Government of the Netherlands**
- **Government of New Zealand**
- **Government of Norway**
- **Government of South Africa**
- **Government of Sudan**
- **Government of Sweden**
- **Government of Switzerland**
- **Government of the United Kingdom of Great Britain and Northern Ireland**
- **Government of the United States of America**
- **The European Union**

Expert reviewer

Rovshan Abbasov
Azerbaijan

Dennis Abel
Germany

María Francisca José Acevedo Gasman
Mexico

Lilibeth Acosta
Phillippines

Manu Aehshatou
Cameroon

Francis Agbere
Ghana

Levon Aghasyan
Republic of Armenia

Ana Paula Aguiar
Brazil

Araceli Aguilar Meléndez
Mexico

Rosendo Ahue Coello
Colombia

Gerardo Alatorre
Mexico

Christine Alaux
France

Monica V. Alegre González
Mexico

Alla Aleksanyan
Republic of Armenia

Steven M. Alexander
Canada

Kelvin Alie
Dominica

Boubasansani Aliou
Cameroon

Lucía O. Almeida Leñero
Mexico

Daniel Alvarez
Chile

Venecia Alvarez
Dominican Republic

Mirna Ambrosio
Mexico

Jeroen Arends
Netherlands

Arfanuzzaman
Bangladesh

Dolores Amelia Arreguín Prado
Mexico

Nétzar Arreourtua M
Mexico

Tizbe Arteaga
Mexico

Simone Athayde
Brazil/United States of America

Anne Atlan
France

Yildiz Aumeeruddy-Thomas
France

Anne-Gaelle Ausseil
New Zealand

Mersudin Avdibegović
Bosnia and Herzegovina

Giovanni Ávila Flores
Mexico

Daniela Ávila
Mexico

María Azahara Mesa
Mexico

Tomas Badura
United Kingdom of Great Britain and Northern Ireland

Susan Baker
United Kingdom of Great Britain and Northern Ireland

Muniyandi Balasubramanian
India

Ben Balmford
United Kingdom of Great Britain and Northern Ireland

Patricia Balvanera
Mexico

Lidiamar Barbosa de Albuquerque
Brazil

Edmundo Barrios
Venezuela/Brazil

Edith Bastidas
Colombia

Ian Bateman
United Kingdom of Great Britain and Northern Ireland

Ramiro Batzin
Guatemala

Miguel Bedoya
Colombia

Thomas Beery
Sweden

Mauricio Bellon
Mexico

Hesiquio Benítez Díaz
Mexico

Marta Berbes
Canada

Erin Betley
United States of America

Alka Bharat
India

Jeanne Biloa
Cameroon

Adelle Blair
Antigua and Barbuda

Eckart Boege
Mexico

Martha Bonilla
Mexico

Michael Bordt
Canada

Sofia Boujida
Morocco

Ella Bowles
Canada

Luke Brander
China

Leah Bremer
United States of America

Marcus Briggs-Cloud
United States of America

Steven Broekx
Belgium

Susie Brownlie
South Africa

Hawe Buba
Cameroon

Balkissou Buba Nouna
Cameroon

Aracely Burgos
Colombia

Javier Cabello
Spain

Pedro Cabral
Portugal

Georgina Cabrera
Mexico

Lea Cabrol
Chile

Rafael Calderón Contreras
Mexico

Julio Campo
Mexico

Andrea Cárdenas
Colombia

Apolinario Carino
Phillippines

Joji Cariño
Phillippines

Jean Carlo Sánchez
Nationality not reported

Carmela Cascone
Italy

Thorkil Casse
Denmark

Jennifer Castañeda-Navarrete
United Kingdom of Great Britain and Northern Ireland

Ricardo Castro Díaz
Brazil

Mollie Chapman
Switzerland

Vratika Chaudhary
United States of America

Samantha Cheng
United States of America

Estrella Chévez
Mexico

Susan Chiblow
United States of America

Jan Chlewicki
Poland

Jens Christiansen
United Kingdom of Great Britain and Northern Ireland

Helena Clayton
Australia

Fuh Cletus
Cameroon

Lydia Cole
United Kingdom of Great Britain and Northern Ireland

Silvia Colmenero
Mexico

Ricardo Contreras
Mexico

Brendan Coolsaet
Belgium

Nigel Cooper
United Kingdom of Great Britain and Northern Ireland

Charlotte Cote
United States of America

Valeria Cruz Blancas
Mexico

Andrea Cruz Angón
Mexico

Ricardo Iván Cruz Cano
Mexico

Tania Alheli Cruz Mejía
Mexico

Maria Cruz Gonzalez
Panama

Emiliana Cruz
Mexico

Myrna Cunningham
Nicaragua

Jósimo da Costa Constant
Brazil

Florence Daguitan
Phillipines

Mahendra Dash
Nationality not reported

Matteo De Donà
Sweden

Gabriela de la Mora
Mexico

Ana De Luca
Mexico

Catherine Debruyne
Belgium

Tomas Declercq
Belgium

Glenn Deliège
Belgium

Lena Dempewolf
Trinidad and Tobago

Padip Dey
India

Chimère Diaw
Senegal

Antonio Díaz de León
Mexico

Sandra Díaz
Argentina

Paola Ivanova Díaz Allen
Mexico

Marta Díaz
Colombia

Kamal Djemouai
Algeria

Ralf Döring
Germany

Yue Dou
Netherlands

Luthando Dziba
South Africa

Juan B. Ebora
Philippines

Hilde Eggermont
Belgium

Cristina Eisenberg
United States of America

El Khitrma EL Awad
Sudan

Khadija EL Houdi
Morocco

Miguel Equihua
Mexico

Gloria Erazo
Colombia

Jaime Erazo
Ecuador

Miguel Angel Escalona Aguilar
Mexico

Ilse Esparza Magaña
Mexico

Fernando Estañol Tecuatl
Mexico

Dora Elena Estrada
Colombia

Michaela Faccioli
United Kingdom of Great Britain and Northern Ireland

Daniel Faith
Australia

Adèle Fardoux
France

Katharine Farrell
Colombia

Alan Feest
United Kingdom of Great Britain and Northern Ireland

Silvia Ferrini
United Kingdom of Great Britain and Northern Ireland

Joseph Ferris
United Kingdom of Great Britain and Northern Ireland

Viviana Figueroa
Argentina

John Finisdore
Australia

Markus Fischer
Switzerland

Judith Fisher
Australia

Dennis Fixler
United States of America

Adriana Carolina Flores Díaz
Mexico

Ana María Flores Gutiérrez
Mexico

Eric Fokam
Cameroon

Rebecca Ford
Australia

The Forooa
Nationality not reported

Kwame Fredua
Ghana

Zuzu Gadallah
Canada

Ghousebasha Gaffar
France

Eduardo García Frapolli
Mexico

Ariana García Galván
Mexico

Jaritzi García García
Mexico

María Carmen García Mateo
Spain

Gabriela García
Mexico

Nadav Gazit
United States of America

Catherine Généreux
Belgium

Patricia Gerez Fernández
Mexico

Patrick Giraudoux
France

Kremena Gocheva
Bulgaria

Susan Goff
Australia

Ana María Gómez Aguayo
Spain

Jaime E. González Barrera
Mexico

Saraí González
Mexico

Tanya González
Mexico

Zolangie González
Colombia

John Gossage
United Kingdom of Great Britain and Northern Ireland

Mark Gough
United Kingdom of Great Britain and Northern Ireland

Amy Graham
Australia

Chrissy Grant
Australia

Charley Granvorka
Martinique

Przemysław Grodzicki
Poland

Ben Groom
United Kingdom of Great Britain and Northern Ireland

Leng Guan Saw
Malaysia

Felipe Guerra
Colombia

Sol Guerrero Ortiz
Mexico

Himangana Gupta
India/ Japan

Moha Haddouch
Morocco

Thomas Hahn
Sweden

Nick Hanley
United Kingdom of Great Britain and Northern Ireland

Alexandra Harrington
Canada

Shizuka Hashimoto
Japan

Janina Heim
Germany

Vera Helene Hausner
Norway

Rosalind Helfand
United States of America

Rob Hendriks
Netherlands

Loni Hensler
Germany/ Mexico

Guadalupe Yesenia Hernández Márquez
Mexico

Álvaro Hernández
Mexico

Hortencia Hidaldo
Chile

Darrell Hillaire
United States of America

Nathalie Hilmi
Monaco

Austin Himes
United States of America

Sean Hoban
United States of America

Aslak Holmberg
Norway

Rachel Hosein Nisbet
United Kingdom of Great Britain and Northern Ireland

Mariaelena Huambachano
Peru, New Zealand/ United States of America

Jasmin Hundorf
Mexico

Margot Hurlbert
Canada

Hindou Ibrahim
Chad

Basiru Isa
Cameroon

Simon James
United Kingdom of Great Britain and Northern Ireland

Romaric Jannel
France/Japan

Fernando Jaramillo Monroy
Mexico

Jakub Jaroński
Poland

Raquel Jiménez Acosta
Mexico

Juan Carlos Jintiach
Ecuador

Alastair Johnson
United Kingdom of Great Britain and Northern Ireland

Jay Julius
United States of America

Jeremiah Julius
United States of America

Tumwikirize Julius
Uganda

Brooks Kaiser
Denmark

Prafulla Kalokar
India

Kahoru Kanari
Japan

Kateřina Kaprová
Czech Republic

Edna Kaptoyo
Kenya

Esmail Karamidehkordi
Islamic Republic of Iran

Oleksandr Karasov
Republic of Estonia/ Finland

Paulina Karimova
Taiwan

Madhav Karki
Nepal

Sylvia Karlsson-Vinkhuyzen
Netherlands

Ivo Kashimana
Germany

Stephen Kashinde
North Macedonia

Ulan Kasymov
Kyrgyzstan

Esther Katz
France

Jean Kayombya
Nationality not reported

Ali Kerem Saysel
Türkiye

Sarah Klain
United States of America

Ryo Kohsaka
Japan

Melanie Kolb
Germany/Mexico

Patricia Koleff
Mexico

Andreas Kontoleon
United Kingdom of Great Britain and Northern Ireland

Teea Kortetmäki
Finland

Eszter Kovács
United Kingdom of Great Britain and Northern Ireland

Martin Kowarsch
Germany

Bob Kreiken
Netherlands

Ramesh Krishnamurthy
India/Canada

Jewel Kudjawu
Ghana

Pramit Kumar Deb Burman
India

Kamal Kumar Rai
Nepal

Jan Kunnas
Finland

Niklas Labba
Norway

Linda Laikre
Sweden

Elifuraha Laltaika
Tanzania

David Lam
Germany/ Mexico

Johannes Langemeyer
Sweden/Spain

Alejandra Larrazábal
Mexico

Margarita N. Lavides
United States

Sandra Lavorel
France

Alexandra Lavrillier
France

Droz Laÿna
Japan

Kuenda Laze
Albania

Elena Lazos
Mexico

Kuang-Chung Lee
Taiwan

George Lee-Harris
United Kingdom of Great Britain and Northern Ireland

Inge Liekens
Belgium

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Sweden

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Bolivia

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Australia

Hannah Longole
Uganda

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Diana López Higareda
Mexico

Ina Susana López Falfan
Mexico

Sofía López-Cubillos
Australia

Isabel Loupa Ramos
Portugal

Lizeth Lozano
Nationality not reported

Carolyn Lundquist
New Zealand

Thingreiphi Lungharwo
India

Manuel Maass
Mexico

Mariana Machado García
Mexico

Liza Mack
United States of America

Teina Mackenzie
Cook Islands

Mostafa Madbouhi
Morocco

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Bangladesh

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Stella Manes
Brazil

Fatima Manji
United Kingdom of Great Britain and Northern Ireland

Juan Manuel Frausto
Mexico

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France

Juana Mariño
Colombia

Berta Martin López
Germany/ Mexico

Jean-Louis Martin
France

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Mexico

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Mexico

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Mexico

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Brazil

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France

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Mexico

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Kenya

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Canada

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Ireland

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United Kingdom of Great Britain and Northern Ireland

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United States of America

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Colombia

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Brazil

Jasper Meya
Germany

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Kenya

Cinnamon Mittan
United States of America

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Morocco

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Chile

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Mexico

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Colombia

Janwar Moreno
Colombia

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Colombia

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United Kingdom of Great Britain and Northern Ireland

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Colombia

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Poland

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Kenya

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Italy

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Ecuador

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Chile

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Mexico

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Mexico

Laura Nahuelhual
Chile

Arthur Naylor
Brazil

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Bulgaria

Simoneta Negrete Yankelevich
Mexico

Sara Nelson
United States of America/ Canada

Ana Claudia Nepote
Mexico

Rachel Neugarten
United States of America

Stijn Neuteleers
Belgium

Beavan Ngoshi
Zimbabwe

Bernard Nichols
Antigua and Barbuda

Julia Niemeyer
Brazil

Maiko Nishi
Japan

Adam P. Novick
United States of America

Jean Bosco Ntirandekura
Burundi

Elie Ntirenganya
Rwanda

Charity Nyelele
United States of America

Patrick O'Farrell
South Africa

Tanya O'Garra
United Kingdom of Great Britain and Northern Ireland

Fuyumi Ogawa
Japan

Olli Ojala
Finland

Sana Okayasu
Netherlands

Quetzalcóatl Orozco Ramírez
Mexico

Isimemen Osemwegie
Nigeria

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Ghana

Merit Otsus
Republic of Estonia

Türkan Özdemir
Türkiye

Görücü Özden
Türkiye

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Germany/Mexico

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Mexico

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Colombia

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Sweden

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Belgium

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India

Hun Park
Republic of Korea

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Canada

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Poland

Piotr Pazura
Poland

Mari Peltola
Finland

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Mexico

Maria Perevochtchikova
Russian Federation/Mexico

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Mexico

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Mexico

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Mexico

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Poland

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Poland

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Brazil

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Canada

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Bulgaria

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Germany

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Eslovenia

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Philippines

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Mexico

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Mexico

Inocencio Ramos
Colombia

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United Kingdom of Great Britain and Northern Ireland

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Australia

Syed H. Raza
Malaysia

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United Kingdom of Great Britain and Northern Ireland

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Mexico

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Philippines

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Colombia

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Spain

Charles Rhodes
United States of America

Miyela Riascos
Colombia

Alessandra Ribeiro de Moraes
Brazil

Anthony Richards
Antigua and Barbuda

Miles Richardson
United Kingdom of Great Britain and Northern Ireland

Maraja Riechers
Germany/Mexico

Alexander Rincón Ruiz
Colombia

Flor Rivera López
Mexico

Erandi Rivera Lozoya
Mexico

Eduardo Robelo
Mexico

Maria Isabel Rodríguez Valero
Belgium

Sandra Rodríguez
Colombia

Laura Rojas González
Mexico

Donald Rojas
Costa Rica

Jaroslaw Romanowski
Poland

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Chile

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Peru

María Rosario Partidario
Lisboa

Florencia Rositano
Argentina

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Colombia

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Mexico

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United States of America

Graciela Rusch
Norway

Kurt Russo
United States of America

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United Kingdom of Great Britain and Northern Ireland

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Canada

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Argentina

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Kenya

Myriam Sánchez-Mejía
Colombia

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Australia

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Germany/Mexico

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Spain

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Brazil

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United Kingdom of Great Britain and Northern Ireland

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India

Francois Sarrazin
France

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Botwsana

Masayuki Sato
Japan

Theresa Satterfield
Canada

Marije Schaafsma
Netherlands / United Kingdom of Great Britain and Northern Ireland

Maria Schultz
Sweden

Gernot Segelbacher
Germany

Odi Selomane
South Africa

Mohamed Sghir Taleb
Morocco

Vyacheslav Shadrin
Russian Federation

Thant Shin
Myanmar

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Switzerland

Tui Shortland
New Zealand

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Germany

Amanda Sigouin
United States of America

Evodia Silva
Mexico

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United States of America

Katharine Sims
United States of America

Severin Sindizera
Burundi

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Canada

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United Kingdom of Great Britain and Northern Ireland

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Mexico

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Netherlands

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Germany

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Sweden

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Sweden

Eleanor Sterling
United States of America

Thomas Sterner
Sweden

Andy Stott
United Kingdom of Great Britain and Northern Ireland

Per Strömberg
Sweden

HRH King Baridam Suanu
Nigeria

Viviana Suárez
Colombia

Andrew Suggitt
United Kingdom of Great Britain and Northern Ireland

Sian Sullivan
United Kingdom of Great Britain and Northern Ireland

Rodion Sulyandziga
Russian Federation

Crispin Swedi Bilombele
Democratic Republic of the Congo

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Japan

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Japan

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Fiji

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Sweden

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Ecuador

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Denmark

Malte Timpte
Germany / Sweden

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Mexico

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Colombia

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Italy

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Hungary

Alejandro Torres García
Mexico

Araceli Torres Morales
Mexico

Marcela Torres
Mexico

Julia Touza
United Kingdom of Great Britain and Northern Ireland

Ana Cristina Tovalin
Mexico

Prasert Trakansuphakon
Thailand

Sofía Treviño Heres
Mexico

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Mexico

Maria Tsiafouli
Greece

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United Kingdom of Great Britain and Northern Ireland

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Netherlands

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Bulgaria

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Mexico

Noel M. Unciano
Philippines

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Mexico

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Colombia

Héctor Alan Valdés Suarez
Mexico

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Chile

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Chile

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Belgium

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Netherlands

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Spain

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Colombia

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Australia

Carla Washbourne
United Kingdom of Great Britain and Northern Ireland

Robert Watson
United Kingdom of Great Britain and Northern Ireland

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Sweden

Sarah Weiskopf
United States of America

Scott Wentland
United States of America

Maria Cristina Weyland Vieira
Brazil

Tom Wild
United Kingdom of Great Britain and Northern Ireland

Louise Willemen
Netherlands

Demian Willette
United States of America

Klara J Winkler
Canada

Robert Winthrop
United States of America

Sebastian Wolfrum
Germany

Linda Wong
China

Travis Wright
United States

Kris Wyckhuys
Vietnam

Lucía Xiloj
Guatemala

Jun Yang
Nationality not reported

Juliana Yeshing Upun
Guatemala

Lun Yin
China

Dandan Yu
China

Nadia Selene Zamboni
Argentina

Luis Zambrano
Mexico

Jinfeng Zhou
China

Marcus Zisenis
Netherlands

Martina Zorić
Serbia

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INTERGOVERNMENTAL SCIENCE-POLICY PLATFORM ON BIODIVERSITY AND ECOSYSTEM SERVICES (IPBES)

IPBES Secretariat, UN Campus

Platz der Vereinten Nationen 1, D-53113 Bonn, Germany

Tel. +49 (0) 228 815 0570

secretariat@ipbes.net

www.ipbes.net

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