



# Implementing the Strategic Action Programme for the South China Sea and Gulf of Thailand (SCS SAP Project)

Second Meeting of the Regional Working Group on Mangroves and Wetlands  
Iloilo City, Philippines 11-12 August 2025

**Summary on achievements at SCS SAP Project sites in implementing the PCA/GSA, including reviews on status of monitoring, and data and information available on mangroves and wetlands**

**THAILAND**



## Achievements, monitoring status and data/information available at the SCS SAP mangroves and wetland sites in Thailand

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### Introduction

As described in the Inception Phase Regional Implementation Report reviewed in the First Steering Committee of the SCS SAP Project held in June 2021, Bangkok, Thailand, the outcomes and outputs for mangrove and wetland focal areas include:

<i><b>Outcome 1.1</b> Appropriate forms of sustainable management established for 860,000 ha of mangroves</i>	<i><b>Outcome 1.4</b> Integrated management of 813,647 ha of coastal wetlands at 19 sites, including habitat restoration and protection strengthened at priority locations</i>
Output 1.1.1 Declaration of 57,400 ha of mangrove as National Parks and Protected Areas	Output 1.4.1 Integrated management plans developed and under implementation for at least 2 lagoons (21,818 ha), 10 estuaries (639,418 ha), 5 tidal flats (96,903 ha), 1 peat swamp (45,700 ha) and 1 non-peat swamp (9,808 ha)
Output 1.1.2 Designation and plans for the management of 166,600 ha of mangrove as non-conversion, sustainable use areas	Output 1.4.2 Declaration of wetland areas with protection status (i.e. non-hunting area, nature reserves, protected areas, Ramsar Sites)
Output 1.1.3 Reform of laws and regulations for the sustainable use of 602,800 ha of mangrove forest	Output 1.4.3 Adoption of a regional monitoring scheme and its national implementation
Output 1.1.4 Replanting of 21,000 ha of deforested mangrove land	
Output 1.1.5 Biodiversity increased for 11,200 ha of mangrove forest via enrichment planting	
Output 1.1.6 Established mechanism for monitoring management, ecological and socio-economic indicators at sites	

Recently, all participating countries signed PCAs/GSAs for implementing national activities, focusing on the site level under component 1. The 2<sup>nd</sup> meetings of the RWGs on habitats will review achievements in implementing the PCA/GSAs at SCS SAP sites (as seen in table 1 for mangroves and wetland) and others funded by co-finance. Summaries of this achievement of Thailand are described in table 2 and 3 below.

Related to knowledge management system, the Second Meeting of the SCS SAP Steering Committee held in January 2024, Bangkok, Thailand adopted the revised workplan of the SCS SAP Project with three outcomes. Among them, outcome 2.1 is Enhanced information-base for coastal habitat management, monitoring and action planning. Under this outcome, a specific regional output for habitat focal areas is 2.1.1. Assessment of existing data and information on coastal habitat in the South China Sea, and review of monitoring and assessment approaches that can support SCS monitoring program, from national, regional and global sources,

combined with project-generated data from Component 1. The extensive compilation, review and analysis of information and data relating to specific habitat sites involve the development of comparable national data and information sets relating to, *inter alia*, the distribution and diversity of coastal habitats, the species richness and hotspots of biodiversity, present threats and the status of management. These enhancements to the information-base for coastal habitat management and action planning will be used to guide the preparation of updated National Reports, the National Action Plans, as well as the revised TDA and SAP.

The Second Meetings of the Regional Working on Habitats will review status of national monitoring, and data and information available at the sites of SCS SAP Project and others, if any, supported by co-finance. The country report of Thailand presents below monitoring status and availability of data and information (table 4).

**Table 1. SCS SAP sites on mangroves and wetlands in participating countries**

Country	Mangrove sites	Wetland sites
Cambodia	Botum Sakor National Park, Peam Krasop Wildlife Sanctuary, Prey Nob District	Koh Kapik Ramsar Site, Kampong Trach, Chumpu Khmao
China	Shangkou, Dongzhaigang, Zhanjiang, Yangjiang, Huidong	Pearl River estuary (Jitimen), Dahu; Maoweiha, Danzhou (Xinyingwan)
Indonesia	Batu Ampar	Sembilang Sector of the Berbak Sembilang NP
Philippines	Busuanga, Coron	Malampaya Sound
Thailand	Pak Panang Bay, Welu River Estuary, Bandon Bay	Don Hoi Lot
Vietnam	Tien Yen, Can Gio	Thai Thuy Wetlands, Tien River Estuary; Tam Giang – Cau Hai lagoon
Total	16 sites, 150,373 ha	13 sites, 416,859 ha

## Summary of achievements in implementing the PCA/GSA

**Table 2. For mangrove sites**

Reg. Output & verification means	<i>Site 1 – Welu River Estuary</i>	<i>Site 2 – Bandon Bay</i>	<i>Site 3 – Pak Panang Bay</i>
1.1.1. Data & information reviews, consultation; Name & Date of PA declaration; management plan developed for total ?? ha, mangrove/tidal flat ??ha	Baseline assessments and zoning plans for sustainable management have been fully completed.	- Baseline assessments and zoning plans for sustainable management have been fully completed. - Formal declaration under protection status through DMCR Article 18 enacted for Bandon Bay (3,078 ha)	Baseline assessments and zoning plans for sustainable management have been fully completed.
1.1.2. Reviews of data & regulation, consultation; awareness raising, capacity building; livelihood alternatives; Management plan for sustainable use developed for ??ha & approved on [date?]. Key activities in implementing the plan?	<p><b>Area Covered:</b> 16,334 ha <b>Achievements:</b></p> <ul style="list-style-type: none"> <li>• Comprehensive management plan finalized and adopted, incorporating sustainable use, conservation, and zoning schemes.</li> <li>• Clear zoning completed— demarcating conservation, sustainable use, and community livelihood zones.</li> <li>• Participatory process: Local communities, provincial authorities, and DMCR engaged in planning and public consultations.</li> <li>• Integration of eco-tourism, community crab banks, mangrove restoration, and sustainable harvesting practices into site management.</li> <li>• Community groups and local patrols established to support</li> </ul>	<p><b>Area Covered:</b> 8,371 ha <b>Achievements:</b></p> <ul style="list-style-type: none"> <li>• Management plan developed and implemented, focusing on resource zoning, sustainable fisheries, and habitat restoration.</li> <li>• Zoning plan includes core conservation areas, community use areas, and buffer zones.</li> <li>• Special focus on resolving land tenure and boundary issues for effective plan enforcement.</li> <li>• Livelihood diversification activities piloted (e.g., ecotourism, non-timber mangrove products).</li> <li>• Training for local stakeholders and</li> </ul>	<p><b>Area Covered:</b> 10,735 ha <b>Achievements:</b></p> <ul style="list-style-type: none"> <li>• Management plan finalized with full stakeholder consultation, integrating conservation and sustainable use objectives.</li> <li>• Zoning plan completed— identifying protection, sustainable use, and restoration areas.</li> <li>• Implementation of sustainable livelihood activities (e.g., sustainable aquaculture, mangrove products, handicrafts, community-based tourism).</li> <li>• Strengthening of community-based monitoring groups to support enforcement and feedback.</li> <li>• Integration of site-specific restoration actions, including replanting degraded mangrove zones.</li> </ul>

Reg. Output & verification means	<i>Site 1 – Welu River Estuary</i>	<i>Site 2 – Bandon Bay</i>	<i>Site 3 – Pak Panang Bay</i>
	management, law enforcement, and monitoring. <ul style="list-style-type: none"> <li>Supporting capacity-building programs for community stakeholders to ensure compliance and sustainability.</li> </ul>	establishment of multi-stakeholder management committees. <ul style="list-style-type: none"> <li>Community groups and local patrols established to support management, law enforcement, and monitoring.</li> <li>Integration of DMCR regulations (Article 18) for formal recognition and enforcement.</li> </ul>	<ul style="list-style-type: none"> <li>Enhanced collaboration with local administrative organizations for ongoing management and monitoring.</li> </ul>
1.1.3. Reviews of legal matters, consultation; Reformed laws/regulation drafted, submitted or adopted on [date] for management of ?? ha of mangroves	No new site-specific legal reform reported (existing regs apply)	Successfully advanced legal reforms through the formal application of DMCR Act Article 18. This legal instrument has granted protected status to 3,078 ha within Ban Don Bay, with additional regulatory measures embedded into local management plans. The declaration has provided a robust foundation for enforcement and sustainable resource use.	No new site-specific legal reform reported (existing regs apply)
1.1.4. Development of methodology, training; How many hectares of mangroves replanted? - Hectares of Mangroves Replanted	<b>Area replanted:</b> 30 ha <b>Methodology:</b> <ul style="list-style-type: none"> <li>Community-led replanting campaigns, supported by DMCR and local authorities.</li> <li>Focus on restoring degraded and erosion-prone zones, using locally sourced seedlings.</li> </ul>	<b>Area replanted:</b> 75 ha <b>Methodology:</b> <ul style="list-style-type: none"> <li>Largest-scale replanting effort among the three sites.</li> <li>Activities included restoration of previously cleared areas, enrichment planting, and edge stabilization along tidal flats.</li> <li>Engagement of multiple stakeholders: community groups, local government, and</li> </ul>	<b>Area replanted:</b> 15 ha <b>Methodology:</b> <ul style="list-style-type: none"> <li>Targeted replanting in sites affected by erosion and past conversion.</li> <li>Restoration work prioritized for areas with high ecosystem service value (e.g., nursery grounds for aquatic species).</li> </ul>

Reg. Output & verification means	Site 1 – Welu River Estuary	Site 2 – Bandon Bay	Site 3 – Pak Panang Bay
	<ul style="list-style-type: none"> <li>• Training programs for youth groups, school children, and resource user groups.</li> <li>• Engagement of multiple stakeholders: community groups, local government, and private sector in some restoration events.</li> </ul>	<p>private sector in some restoration events.</p> <ul style="list-style-type: none"> <li>• Monitoring plots established for survival rate tracking and adaptive management.</li> </ul>	<ul style="list-style-type: none"> <li>• Capacity-building and follow-up training supported by local DMCR offices and NGOs.</li> <li>• Engagement of multiple stakeholders: community groups, local government, and private sector in some restoration events.</li> </ul>
1.1.5. Development of methodology, training; Species and area (ha) of mangroves enriched?	<p><b>Area enriched:</b> 5 ha  <b>Key species:</b></p> <ul style="list-style-type: none"> <li>• <i>Rhizophora apiculata</i> (โกงกางใบเล็ก)</li> <li>• <i>Bruguiera cylindrica</i> (ตะบูนขาว)</li> <li>• <i>Avicennia alba</i> (แสมขาว)</li> <li>• <i>Sonneratia caseolaris</i> (ลำแพน)</li> </ul> <p><b>Methodology &amp; Training</b></p> <ul style="list-style-type: none"> <li>• Enrichment focused on degraded patches and previously mono-species zones.</li> <li>• Activities emphasized ecological restoration, resilience to climate impacts, and enhanced fisheries habitats.</li> <li>• Ongoing monitoring by local youth and resource user groups.</li> </ul>	<p><b>Area enriched:</b> 10 ha  <b>Key species:</b></p> <ul style="list-style-type: none"> <li>• <i>Rhizophora mucronata</i> (โกงกางใบใหญ่)</li> <li>• <i>Ceriops tagal</i> (แสมทะเล)</li> <li>• <i>Xylocarpus granatum</i> (ตะบูนดำ)</li> </ul> <p><b>Methodology &amp; Training:</b></p> <ul style="list-style-type: none"> <li>• Largest enrichment area among the three sites.</li> <li>• Multi-species approach implemented, increasing both canopy and understorey diversity.</li> <li>• Involvement of local fishery groups and eco-tourism networks.</li> <li>• Follow-up care and survival assessments included in regular management activities.</li> </ul>	<p><b>Area enriched:</b> 3 ha  <b>Key species:</b></p> <ul style="list-style-type: none"> <li>• <i>Bruguiera gymnorhiza</i> (ตะบูนแดง)</li> <li>• <i>Sonneratia ovata</i> (ลำแพนใบกลม)</li> </ul> <p><b>Methodology &amp; Training:</b></p> <ul style="list-style-type: none"> <li>• Enrichment prioritized for areas recovering from past disturbance and erosion.</li> <li>• Community groups and schools actively participated in planting and monitoring.</li> <li>• Success indicators included increased native species cover and improved seedling survival.</li> </ul>
1.1.6. Methodology training; Indicators, frequency and number of stations; number of replicates, trend of change?	<p><b>Development of Methodology and Training</b></p> <ul style="list-style-type: none"> <li>• <b>Methodology:</b> <ul style="list-style-type: none"> <li>○ Standardized monitoring protocols developed at national and site levels, aligned with SCS SAP/DMCR frameworks.</li> <li>○ Indicators and procedures formalized in site management plans and training manuals.</li> <li>○ Emphasis on participatory monitoring, with community involvement in data collection and reporting.</li> </ul> </li> </ul>		

Reg. Output & verification means	Site 1 – Welu River Estuary	Site 2 – Bandon Bay	Site 3 – Pak Panang Bay
	<ul style="list-style-type: none"> <li>• <b>Training:</b> <ul style="list-style-type: none"> <li>○ Series of training workshops conducted for local government staff, community monitoring groups, and youth representatives.</li> <li>○ Training covered use of field equipment, data recording, sample collection, species identification, and use of digital tools for reporting.</li> </ul> </li> </ul>		
	<p><i>Indicators Monitored:</i></p> <ul style="list-style-type: none"> <li>• <b>Ecological Indicators:</b> <ul style="list-style-type: none"> <li>○ Mangrove forest cover (canopy density, area change)</li> <li>○ Species diversity and abundance (trees and aquatic fauna)</li> <li>○ Seedling survival and regeneration rates</li> </ul> </li> <li>• <b>Socio-economic Indicators:</b> <ul style="list-style-type: none"> <li>○ Household income from mangrove-related livelihoods</li> <li>○ Participation in community-based activities</li> <li>○ Compliance and incidence of resource use infractions</li> </ul> </li> </ul>		
	<p><i>Frequency:</i></p> <ul style="list-style-type: none"> <li>• <b>Ecological indicators:</b> Monitored 1-2 times per year</li> <li>• <b>Socio-economic indicators:</b> Monitored in certain year at the end of key livelihood/activity cycles</li> </ul>		
	<p><i>Number of Replicates:</i></p> <ul style="list-style-type: none"> <li>• <b>Field measurements:</b> Each indicator at each station has <b>3–5 replicates</b> per sampling event to ensure data reliability.</li> </ul>		
	<p><i>Number of Monitoring Stations:</i> 5 stations (distributed across conservation, use, and buffer zones)</p>	7 stations (covering core, buffer, and community use areas)	3 stations (targeting representative habitats and restoration zones)
	<p><i>Trend of Change:</i></p> <ul style="list-style-type: none"> <li>• Stable or <b>increasing forest cover</b> and improved natural regeneration rates.</li> <li>• <b>Increased species diversity</b> recorded in enrichment zones.</li> <li>• Socio-economic indicators show <b>modest growth in</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Positive trend in forest health</b>, with increased canopy density and expansion in reforested areas.</li> <li>• <b>Steady increase in aquatic fauna diversity</b> and improved water quality in restored areas.</li> <li>• Enhanced community engagement and compliance, with infractions reduced.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Recovery of degraded zones</b> observed, with above-average seedling survival in recent plantings.</li> <li>• Socio-economic surveys show <b>higher engagement</b> in community monitoring and alternative livelihoods.</li> </ul>

Reg. Output & verification means	<i>Site 1 – Welu River Estuary</i>	<i>Site 2 – Bandon Bay</i>	<i>Site 3 – Pak Panang Bay</i>
	household income and participation rates.		

### Tale 3. For wetland sites

Reg. Output & verifications	<i>Site 1 – Don Hoi Lot</i>
<p>1.4.1. Reviews of data &amp; legal matters, consultation; awareness raising, capacity building; livelihood alternatives; Integrated management plan developed for total ??ha &amp; approved on [date?], mangrove/tidal flat/seagrass ??ha; Key activities in implementing the plan?</p>	<p><i>1. Review of Data &amp; Legal Matters</i></p> <ul style="list-style-type: none"> <li>• Comprehensive baseline assessments were conducted covering ecological, socio-economic, and legal aspects of the Don Hoi Lot area.</li> <li>• The review included consolidation of existing scientific and monitoring data for mangrove, tidal flat, as well as bird and aquatic fauna diversity.</li> <li>• Legal and institutional analysis confirmed the need for strengthened protection, leading to the draft proposal for Ramsar designation and stronger integration under provincial and DMCR regulations.</li> <li>• Formal consultations were held with relevant government agencies, local authorities, and resource user groups to align the management plan with legal mandates.</li> </ul> <p><i>2. Stakeholder Consultation, Awareness Raising, and Capacity Building</i></p> <ul style="list-style-type: none"> <li>• Multi-stakeholder consultation workshops were organized, involving provincial authorities, local governments, community leaders, resource users, and youth groups.</li> <li>• Awareness-raising campaigns targeted schools, and the general public, emphasizing the ecological and economic value of the Don Hoi Lot wetland system.</li> <li>• Capacity building was delivered via training sessions on ecosystem monitoring, resource management, and alternative livelihood skills (e.g. value-added seafood processing).</li> <li>• Special attention was given to gender-sensitive participation and inclusion of marginalized groups.</li> </ul> <p><i>3. Livelihood Alternatives</i></p> <ul style="list-style-type: none"> <li>• Introduction and support focusing on sustainable shellfish gathering, artificial habitat (fish-house) and bird watching.</li> <li>• Promotion of value-added processing for local aquatic products and non-timber mangrove resources.</li> <li>• Support for local guide associations and women’s groups to diversify income sources while reducing ecological pressure on sensitive habitats.</li> </ul> <p><i>4. Integrated Management Plan Development</i></p> <ul style="list-style-type: none"> <li>• An integrated management plan was developed, covering the entire Don Hoi Lot wetland system and its buffer zones.</li> <li>• Total management area: Approximately 8,000 ha (mangrove, tidal flats, and associated aquatic zones). <ul style="list-style-type: none"> <li>○ Mangroves: ~1,200 ha</li> <li>○ Tidal flats: ~5,000 ha</li> </ul> </li> </ul>

Reg. Output & verifications	<i>Site 1 – Don Hoi Lot</i>
	<ul style="list-style-type: none"> <li>• The plan was approved in 2024 by the provincial administrative committee and endorsed by DMCR, with the process for Ramsar site designation ongoing.</li> </ul> <p><i>5. Key Activities in Implementing the Plan</i></p> <ul style="list-style-type: none"> <li>• Zoning and boundary demarcation: Establishment of core conservation zones, community use areas, and buffer zones within the wetland.</li> <li>• Installation of artificial reefs and shellfish habitat structures to enhance biodiversity, nursery for fish juvenile, and stabilize eroded tidal flats.</li> <li>• Restoration and enrichment planting in degraded mangrove areas, with community-led campaigns.</li> <li>• Strengthening of enforcement and surveillance through local patrols and collaborative monitoring with DMCR.</li> <li>• Monitoring of ecological indicators: Regular assessment of shellfish-razor clam (<i>Solen regularis</i>) and hard clam (<i>Gafrarium tumidum</i>); and migratory shorebird populations.</li> <li>• Support for sustainable fisheries and resource management to balance conservation objectives and local livelihoods.</li> <li>• Regular multi-stakeholder meetings for adaptive management and responsive decision-making.</li> </ul>
1.4.2. Data & information reviews, consultation; Name & Date of PA declaration; management plan developed for total ?? ha, mangrove/tidal flat/seagrass ??ha	<p><i>Data &amp; Information Reviews, Consultation</i></p> <ul style="list-style-type: none"> <li>• A comprehensive review of ecological and socio-economic data was completed, covering mangrove, and tidal flat at Don Hoi Lot.</li> <li>• Reviews consolidated monitoring data on habitat extent, species composition, bird and aquatic fauna, as well as ecosystem services.</li> <li>• Stakeholder consultations were conducted with provincial authorities, DMCR, local communities, and relevant experts to validate findings and guide protection strategies.</li> </ul> <p><i>Name &amp; Date of Protected Area (PA) Declaration</i></p> <ul style="list-style-type: none"> <li>• Name: Don Hoi Lot Wetland Protected Area (พื้นที่ชุ่มน้ำดอนหอยหลอด)</li> <li>• Date of Declaration: Officially declared as a provincial-level protected wetland in 2024, with endorsement from the Provincial Administrative Committee and DMCR.</li> <li>• Don Hoi Lot Wetland (Ramsar Site No. 1099) was designated as a Ramsar site on 5 July 2001.</li> </ul> <p><i>Management Plan Coverage &amp; Area by Habitat</i></p> <ul style="list-style-type: none"> <li>• Total area under management plan: ~8,000 ha</li> <li>• Habitat breakdown: <ul style="list-style-type: none"> <li>○ Mangrove: ~1,200 ha</li> <li>○ Tidal flat: ~5,000 ha</li> </ul> </li> </ul>
1.4.3. Methodology training; Indicators, frequency and number of stations; number of replicates, trend of change?	<p><i>Methodology and Training</i></p> <ul style="list-style-type: none"> <li>• Methodology: <ul style="list-style-type: none"> <li>○ Monitoring protocols align with DMCR and SCS SAP project standards for wetland and estuarine sites.</li> <li>○ Site-level guidelines focus on representative station selection for mangrove, and tidal flat monitoring.</li> <li>○ Systematic ecological and socio-economic monitoring is embedded in the site’s integrated management plan.</li> </ul> </li> </ul>

Reg. Output & verifications	<i>Site 1 – Don Hoi Lot</i>										
	<ul style="list-style-type: none"> <li>• Training: <ul style="list-style-type: none"> <li>○ Provincial DMCR teams, site managers, and local leaders received practical field training on: <ul style="list-style-type: none"> <li>▪ Use of standardized monitoring forms and tools</li> <li>▪ Ecological assessment techniques for vegetation, shellfish, and aquatic fauna</li> <li>▪ Water quality and sediment analysis</li> </ul> </li> </ul> </li> </ul> <p>Indicators Monitored</p> <ul style="list-style-type: none"> <li>• Ecological: <ul style="list-style-type: none"> <li>○ Mangrove forest health (canopy cover, regeneration)</li> <li>○ Tidal flat (coverage, species diversity, shellfish density)</li> <li>○ Water and sediment quality (salinity, pH, turbidity)</li> <li>○ Migratory bird populations (seasonal counts)</li> </ul> </li> <li>• Socio-economic: <ul style="list-style-type: none"> <li>○ Resource use patterns (e.g., shellfish harvesting frequency)</li> <li>○ Participation in eco-tourism and conservation activities</li> </ul> </li> </ul> <p>Monitoring System</p> <table border="0"> <thead> <tr> <th>Parameter</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Number of stations</td> <td>5–6 stations (across core habitat types: mangrove, tidal flat, and reference points)</td> </tr> <tr> <td>Number of replicates</td> <td>3–5 per indicator per station per sampling event</td> </tr> <tr> <td>Frequency</td> <td>Quarterly (ecological), annually (socio-economic)</td> </tr> <tr> <td>Responsible parties</td> <td>DMCR provincial office, trained local monitoring teams</td> </tr> </tbody> </table> <p>Trend of Change (from available references)</p> <ul style="list-style-type: none"> <li>• Mangrove: <ul style="list-style-type: none"> <li>○ Forest area is stable to slightly increasing, with effective natural regeneration in restored zones.</li> </ul> </li> <li>• Tidal flat: <ul style="list-style-type: none"> <li>○ Shellfish density and benthic biodiversity are showing improvement due to reduced overharvesting and better management.</li> </ul> </li> <li>• Water/Sediment Quality: <ul style="list-style-type: none"> <li>○ No signs of major degradation; key indicators (salinity, turbidity) remain within target ranges.</li> </ul> </li> <li>• Socio-economic: <ul style="list-style-type: none"> <li>○ Positive trends in income diversification (eco-tourism, sustainable resource use), and increased stakeholder engagement in conservation.</li> </ul> </li> </ul>	Parameter	Value	Number of stations	5–6 stations (across core habitat types: mangrove, tidal flat, and reference points)	Number of replicates	3–5 per indicator per station per sampling event	Frequency	Quarterly (ecological), annually (socio-economic)	Responsible parties	DMCR provincial office, trained local monitoring teams
Parameter	Value										
Number of stations	5–6 stations (across core habitat types: mangrove, tidal flat, and reference points)										
Number of replicates	3–5 per indicator per station per sampling event										
Frequency	Quarterly (ecological), annually (socio-economic)										
Responsible parties	DMCR provincial office, trained local monitoring teams										

## Summary on status of monitoring related mangroves and wetlands in Thailand

### 1. Total Number of Monitoring Stations: 18

- **Mangrove Sites:**
  - Welu River Estuary: 5 stations
  - Ban Don Bay: 7 stations
  - Pak Phanang: 3 stations
- **Wetland Site:**
  - Don Hoi Lot: 3 stations (across mangrove, tidal flat)

### 2. Locations:

- All stations are spatially distributed to represent core conservation zones, sustainable use areas, and buffer zones within each site.
- Stations are georeferenced and mapped by DMCR; the locations are available in DMCR's national coastal habitat monitoring system and referenced in project reports.
- Example locations:
  - Welu River Estuary (Chanthaburi Province)
  - Ban Don Bay (Surat Thani Province)
  - Pak Phanang (Nakhon Si Thammarat Province)
  - Don Hoi Lot (Samut Songkhram Province)

### 3. Ecological Indicators:

- **Mangroves:**
  - Forest cover (area, canopy density, change over time)
  - Species composition and biodiversity (trees, seedlings)
  - Regeneration and seedling survival rates
  - Soil and water quality (salinity, pH, organic matter)
- **Wetlands (incl. tidal flats):**
  - Area and condition of tidal flats
  - Shellfish and benthic fauna density
  - Migratory bird abundance (Don Hoi Lot)

### 4. Socio-economic Indicators:

- Number and income of resource users (e.g., fishers, shellfish gatherers)
- Participation in community-based activities and eco-tourism
- Compliance with management regulations

### 5. Frequency:

- Ecological indicators:
  - Quarterly (every 3 months):  
All key ecological variables at each station (mangrove, wetland, tidal flat health, species diversity)
- Socio-economic indicators:
  - Annually:  
Household income, participation rates, and livelihood surveys
- Special campaigns:
  - As needed:  
For major events such as migratory bird surveys or post-restoration assessment

**Table 4. Availability of data and information at the sites on mangroves and wetlands**

[Note: Recently Available (RA), Will be available (WA), Not available (NA), Remark: Reason for not available]

Type of Data/Information	MG1: Welu River	MG2: Ban Don Bay	MG3: Pak Phanang Bay	WL1: Don Hoi Lot	Remark/Reason for WA/NA
Geographic information	RA	RA	RA	RA	
Co-ordinate	RA	RA	RA	RA	
Description (lagoon, tidal flats, etc.)	RA	RA	RA	RA	
Habitat mapping	RA	RA	RA	RA	
Mangrove area (ha)	RA	RA	RA	RA	
Tidal flat area (ha)	WA	WA	WA	RA	<b>WA:</b> Only Don Hoi Lot has comprehensive tidal flat mapping; other sites (mangrove focus) have partial or pending tidal flat mapping.
Seagrass area (ha)	WA	WA	WA	NA	<b>WA:</b> Seagrass mapping underway for MG1, MG2; <b>NA:</b> Not relevant or present at Don Hoi Lot.
Change of mangrove area since 2010	RA	RA	RA	RA	
Biological information	RA	RA	RA	RA	
Proportion of total area natural/replanted	RA	RA	RA	RA	
Number of true mangrove species	RA	RA	RA	RA	
True mangrove tree species density (no ha-1)	RA	RA	RA	RA	
Crustacea – Crab genera, density	WA	WA	WA	RA	<b>WA:</b> Ongoing species identification/monitoring at MG sites.
Molluscs – Bivalve genera, density	WA	WA	WA	RA	<b>WA:</b> Data is partial/being updated at MG sites.
Molluscs – Gastropods genera, density	WA	WA	WA	RA	<b>WA:</b> Similar as above.
Fish – Residents, species abundance	WA	WA	WA	RA	<b>WA:</b> Full monitoring at WL1; data for MG sites in progress or not yet consolidated.
Fish – Transient for breeding, species abundance	WA	WA	WA	RA	<b>WA:</b> See above.
Changes of fisheries resources	WA	WA	WA	RA	<b>WA:</b> Assessments ongoing or planned for MG sites.
Mammals, resident	WA	WA	WA	RA	<b>WA:</b> Incomplete mammal surveys at MG sites.
Birds, resident species	WA	WA	WA	RA	<b>WA:</b> Don Hoi Lot has recent comprehensive bird data; other MG sites updating.
Birds, migratory species	WA	WA	WA	RA	<b>WA:</b> Full data at WL1; partial/in-progress at MG sites.
Reptiles, resident species	WA	WA	WA	RA	<b>WA:</b> Reptile surveys less prioritized at MG sites.

List others as available (e.g. mud crab)	WA	WA	WA	RA	<b>WA:</b> Supplementary taxa data not complete at MG sites.
Formations – number of canopy layers (strata)	WA	WA	WA	RA	<b>WA:</b> Detailed vertical structure surveys pending at MG sites.
Social – use information	RA	RA	RA	RA	
Ownership	RA	RA	RA	RA	
Management regime	RA	RA	RA	RA	
Current use	RA	RA	RA	RA	
Potential use	RA	RA	RA	RA	
Significance/national importance	RA	RA	RA	RA	
Protection category (MPA, NP...), area in ha	RA	RA	RA	RA	
Area of replanted mangroves	RA	RA	RA	RA	
Stress-pressure information	RA	RA	RA	RA	
Resident human population	RA	RA	RA	RA	
Natural threats (e.g. typhoon, sediment, flood)	WA	WA	WA	RA	<b>WA:</b> Some sites have partial or incident-based records only.
Changes in catchment basin	WA	WA	WA	RA	<b>WA:</b> Incomplete, especially for upstream/catchment changes.
Rates of loss of cover/species since 2010	RA	RA	RA	RA	
Social and economic drivers of change	RA	RA	RA	RA	
Economic valuation	WA	WA	WA	RA	<b>WA:</b> Comprehensive at WL1; partial/being developed at MG sites.
Values of direct use	WA	WA	WA	RA	<b>WA:</b> See above.
Values of indirect use	WA	WA	WA	RA	<b>WA:</b> See above.
Values from environmental services	WA	WA	WA	RA	<b>WA:</b> See above.
Value of investment	WA	WA	WA	RA	<b>WA:</b> Financial/economic analysis ongoing at MG sites.
Values of potential (commercial) sustainable use	WA	WA	WA	RA	<b>WA:</b> Not all MG sites have completed these assessments.
Total Economic Value	WA	WA	WA	RA	<b>WA:</b> Comprehensive analysis at WL1; others in progress.
Economic losses from impact/habitat loss	WA	WA	WA	RA	<b>WA:</b> Only modeled/estimated for Don Hoi Lot; other sites pending.