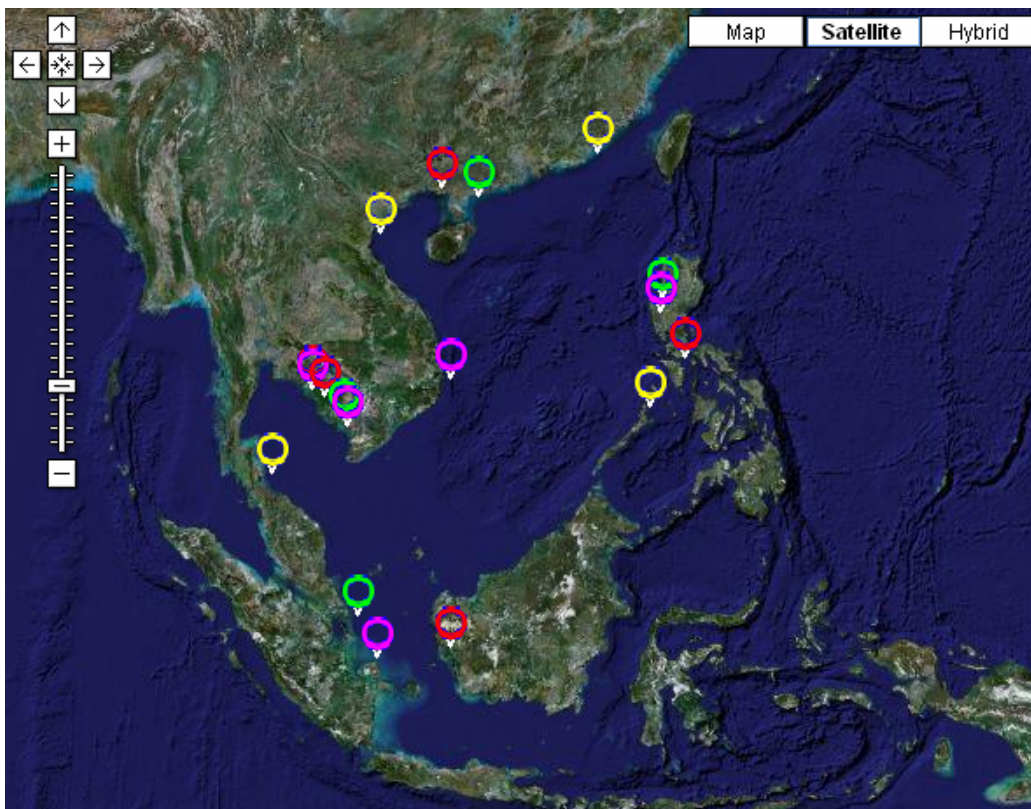




**Establishing an Online Collaborative Information Base in
the Context of the UNEP/GEF Project Entitled:
*“Reversing Environmental Degradation Trends
in the South China Sea and Gulf of Thailand”***





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Cover Illustration: The habitat demonstration sites of the UNEP/GEF South China Sea Project presented on a Google Earth map on <www.unepscs.org>.

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ESTABLISHING AN ONLINE COLLABORATIVE INFORMATION BASE IN THE CONTEXT OF THE UNEP/GEF PROJECT ENTITLED: “REVERSING ENVIRONMENTAL DEGRADATION TRENDS IN THE SOUTH CHINA SEA AND GULF OF THAILAND”

BACKGROUND

The project entitled “Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand” is funded by the Global Environment Facility (GEF) and implemented by the United Nations Environment Programme (UNEP) in partnership with seven riparian states bordering the South China Sea. The project is complex since it addresses three priority areas of concern identified in the Transboundary Diagnostic Analysis (TDA)¹, (Talaue-McManus, 2000) namely the loss and degradation of coastal habitats, over-exploitation of fisheries in the Gulf of Thailand, and land-based pollution.

The original outcomes and outputs of the project were anticipated as being: an approved Strategic Action Programme of targeted and costed actions; a recommended framework for improved regional co-operation in the management of the environment of the South China Sea; a series of national and regional management plans for specific habitats and issues; nine demonstration management activities at sites of regional and global significance; a regional management plan for maintenance of transboundary fish stocks in the Gulf of Thailand; pilot activities relating to alternative remedial actions to address priority transboundary pollutants; and adopted water quality objectives and standards.

The first meeting of the Regional Scientific and Technical Committee (RSTC) (UNEP, 2002) identified that the achievement of these goals and objectives could be constrained by insufficient data and information at both national and regional levels. At that meeting the RSTC instructed the Regional Working Groups (RWGs) to prepare lists of data and information required to characterise specific habitat types during their first meetings. The committee also urged the National Technical Working Groups, and national committees in each country to review the data and information collated during the preparatory phase of the project, and to regularly provide updated data and information, particularly in relation to data sources which may have been ignored during the preparation of the national reports used in finalising the Transboundary Diagnostic Analysis in 1999 (Talaue-McManus, 2000).

The complexity of the project which involved seven countries and six major areas of activity resulted in the establishment of a large network of institutions and individuals involved directly and indirectly in project activities. A total of 31 government designated institutions or organisations have signed Memoranda of Understanding with UNEP to act as Specialised Executing Agencies (SEAs) for the project, and most SEAs have sub-contracted additional national institutions to assist in the completion of specific activities.

This has resulted in more than 100 institutions in the region being directly involved in the execution of project activities, and more than 400 institutions involved through individual participation in meetings and national level activities. This extensive network represents numerous entry points to an enormous number of national level sources of data and information relating to the science and management of habitats, fisheries, and land-based pollution in the South China Sea and Gulf of Thailand. The unique management framework of the South China Sea project (UNEP, 2005) has facilitated the flow of information and data between and among all partners.

DEVELOPMENT OF THE SOUTH CHINA SEA PROJECT WEBSITE

The South China Sea project website <www.unepscs.org> was initially developed in 2002 at the start of the preparatory phase of the project for the online storage and download of information and discussion documents prepared by the Project Co-ordinating Unit (PCU) as inputs to the numerous (16 to 18) regional meetings convened annually during the preparatory phase of the project from 2002 to mid-2004. This initial project website was a simple, static site maintained by the PCU and containing project related documents for easy access by partner institutions and individuals.

¹ All project related documents cited in this paper can be found on the project website at www.unepscs.org.

In July 2005, the PCU decided to re-develop the project website using content management system software in order to improve:

- Communication among project partners,
- The flow of project news and information to project partners,
- Accessibility to project outputs, and
- Enable project partner contributions to the site.

The implementation of demonstration site and pilot activities during the project's operational phase highlighted the need for a website that could support the online sharing of experiences and lessons learned in near real time. Subsequently a new project website was launched at the project's 2nd Regional Scientific Conference in November 2005, and the structure and content were reviewed by the Sixth Meeting of the Regional Scientific and Technical Committee in December 2005 (UNEP, 2006).

The Joomla Content Management System <www.joomla.org> was used to develop the new website. This platform was selected because it is free, easy to install, simple to manage, and reliable. The platform also enables project partners to publish and update their own content on the site using a user-friendly web-browser based interface. It also contains a facility that can be used for controlling publishing processes and assigning specific authoring, editing, and/or publishing rights to various individuals via a secure login procedure.

User Log-In Tool to Facilitate Project Partner Contributions to the Project Website

By employing the user login facility of the Joomla content management system, project partners have been provided with access to contribute material directly to the project website. It is anticipated that this may assist in developing a sense of ownership over the site amongst project partners, such that they will assume progressively higher levels of responsibility for the operation and maintenance of the website over time.

The system distinguishes 5 types of website users:

1. Public – who have rights to use all publicly available aspects of the website
2. Registered – who have rights to use e-forums, contribute news items, and submit web links
3. Authors – who have rights to create content for the website
4. Editors – who have rights to decide on what content will be published on the website and where
5. Publishers – who have rights to publish content to the website

The level of rights and control over what is published to the website increases from the public user level to the publisher level. Users with higher levels of control over the site also have the same rights as those users with less control, although it is possible to restrict the rights or level of control of all users to specific parts of the site. For instance, the manager of a demonstration site may be assigned publisher level rights to that part of the website relating to that demonstration site, and be assigned registered user rights for the rest of the site.

User Registration and the Distribution of a Website Instructional Guide

All project partners were registered as users of the website and in January 2006 usernames and passwords were sent to each individual by e-mail. All project partners can update their own online profiles, participate in the e-forum discussions, and submit basic content such as news items, information about upcoming events, and web links to the website. A comprehensive instruction guide on the use of the South China Sea project website was prepared and e-mailed to all project partners in February 2006. This guide is available for download from <unepscs.org> and has been distributed to members of the project network during regional meetings of the South China Sea project in 2006 and 2007 on a CD-ROM.

KEY FEATURES OF THE SOUTH CHINA SEA PROJECT WEBSITE

The South China Sea project website supports a variety of features including:

- The Partner Network Contacts Database
- Information Pages for each Regional Working Group, Regional Task Force, and Demonstration Site
- Electronic Discussion Forums
- A Monthly E-Newsletter
- The SCS “Blog”
- RSS News Feeds
- An Online “Helpdesk”

Partner Network Contacts Database

The South China Sea project partner network consists of in excess of one hundred institutions directly involved in the project, and more than four hundred institutions indirectly involved through individual participation on National Committees and Sub-committees, and the management boards of demonstration sites. In order to assist project partners in searching contact details for their regional counterparts, a Partner Network Contacts Database was developed and is searchable from the homepage of <unepscs.org>.

The Partner Network Contacts Database contains contact details for project partners searchable by partner type and country. It is possible for each project partner to update their own contact information online. The database currently contains contact details for 157 individuals including, National Focal Points, National Technical Focal Points, Specialised Executing Agencies, Focal Points for project components, Regional Task Force Members, Demonstration Site Managers and Local Government Officials, Regional Experts, and the Project Co-ordinating Unit staff.

Regional Working Group, Regional Task Force, and Demonstration Site Information Pages

Information pages for each individual Regional Working Group, Regional Task Force, and Demonstration Site have been added to the website to facilitate the sharing of information regarding the outputs, ongoing work, and lessons learned of each of these specialist groups. Project component focal points, task force members, and demonstration site managers can edit and update pages for which they have been assigned responsibility. A summary of the types of information that these pages contain is provided in Table 1.

Table 1 Information provided on the Regional Working Group, Regional Task Force, and Demonstration Site Pages.

Regional Working Groups	Regional Task Forces	Demonstration Sites
<ul style="list-style-type: none"> • Complete contact details for members of the Regional Working Group • Overview of the work of the groups • Link to the meeting reports of the working group • Links to the project documents and information pages for the demonstration sites specific to the group • Link to the SCS habitat review specific to the group • Link to the SCS Online Meta-Database • Link to the e-forums specific to the group • Links to national reports 	<ul style="list-style-type: none"> • Complete contact details for members of the Regional Task Force • Overview of the work of the task force • Link to the meeting reports of the task force • Link to the e-forums specific to the group 	<ul style="list-style-type: none"> • Complete contacts for the demonstration site, including Site Manager, local government officials, focal point, and relevant PCU Officer • Link to the demonstration site project document • Latitude and longitude • An overview of the purpose, rationale, objectives, and anticipated outcomes for the site • Links to the reports of the meetings of the relevant Regional Working Group(s) • Link to the relevant SCS habitat review • Link to site website, news articles, or videos

Electronic Discussion Forum (E-Forum)

An e-forum is a facility for holding discussions that is essentially a website composed of a number of individual forums, each forum having one or more discussion topics. Each topic serves as a discussion point for a series of member-written posts. Each topic remains saved on the forum website for future reading until removed by the site administrator. All South China Sea project partners were registered as members of the South China Sea project e-forum in January 2006 and issued with a username and password thus enabling them to post messages in the e-forum.

The difference between an e-forum and electronic mailing lists is that mailing lists automatically deliver new messages to the subscriber, while the e-forum requires the member to visit the website, and check for new posts. Due to the possibility of partners missing replies to topics of relevance to them, the South China Sea e-forum features an "e-mail notification" feature, where an e-mail and/or SMS message is automatically sent to all users who have chosen to be notified, informing them that a new post has been made.

The e-forum facility is potentially a powerful means of improving inter-sessional communication on substantive matters, however, usage of this tool to date has been modest. Despite all Regional Working Groups and Task Forces making commitments to establish and participate in specialist e-fora, a total of only 105 postings have been made by 38 members of the project network under 15 discussion topics (Table 2). A substantial amount of time is expended by the Project Co-ordinating Unit in maintaining the e-forum, including the installation of software updates and updating mailing lists with new and additional e-mail addresses for new and existing members of the network alike. The maintenance of the bridge between the Joomla Content Management system which acts as the platform for the South China Sea website, and entry point to the e-forum for many website users, also requires investment of PCU resources.

The issue of non-participation of network members in the e-forum was discussed during the Seventh Meeting of the Regional Scientific and Technical Committee in November 2006. It was agreed during that meeting that the e-forum should be expanded to cover more general issues relating to environment and natural resource management in the South China Sea. It was noted that this would provide greater opportunity for individuals both from within and outside the project network to utilise and develop experience in the use of such online communications tools. In response a discussion topic on oil pollution along the Vietnamese coast of the South China Sea was initiated, but despite regular promotion of this topic in project newsletters, and dispatch of notification and reminder e-mails to the project network members, only 1 individual contributed information to the discussion.

Table 2 Project network member usage of the South China Sea e-forum to 30th September 2007.

E-Forum Topic	Date Established	Number of Posts from PCU	Number of Posts from Network Members	Number of Network Members Participating
Viet Nam Oil Spill	27/03/2007	1	1	1
Demonstration Site Information Exchange	12/06/2006	1	4	2
RTF-E: Inputs to the Strategic Action Programme	30/01/2007	4	2	2
RTF-E: After meeting concerns	30/08/2006	1	3	2
RTF-L: Mechanism for Information Exchange	05/05/2006	2	5	2
RTF-L: Inputs to the Strategic Action Programme	20/09/2006	2	0	0
RWG-CR: Humphead Wrasse and Cites	18/07/2006	3	0	0
RWG-SG: Seagrass Inputs to the SAP	01/08/2006	6	9	8
RWG-M: Science for Mangrove Management	02/05/2007	8	62	11
RWG-M: Hoang Tri's Message	25/09/2006	8	7	3
RWG-W: Wetland Inputs to the SAP	27/06/2006	3	3	2
RWG-W: Wetlands Monitoring System for SCS	27/06/2006	1	0	0
RWG-F: Establishing Fisheries <i>Refugia</i>	28/02/2007	7	3	2
RWG-F: Paper on Fisheries <i>Refugia</i> and MPAs	18/07/2007	5	4	2
SCS Training Course Nominees	02/02/2007	4	2	1
		56	105	38

The Regional Working Group on Mangroves (RWG-M) noted two possible reasons for low-level participation in e-fora discussions. The first related to the inexperience of most members of the group in the use of such software online, whilst the second concerned the difficulty of stimulating discussion amongst a small group of 7-9 individuals during inter-sessional periods due to work and other commitments. The RWG-M agreed to expand the core base of participants in the mangrove related e-forum by including individuals from the Regional Training Course on mangroves in the group. As highlighted in Table 2, this strategy appears to have been successful and may serve as an important lesson in how to enhance inter-sessional communication amongst a network such as that developed within the framework the South China Sea project.

The South China Sea Project E-Newsletter

The PCU began sending a regular e-mail newsletter to all project partners in March 2006. This e-newsletter contains information from the PCU regarding new content (e-forum posts, documents, multi-media etc.) recently added to the website, links to reviews and reports of recent meetings, and information about upcoming meetings and other important project related matters. Table 3 summarises the members of the SCS project Partner Network and the other organisations to whom the e-newsletter is currently sent. Project partners have been encouraged in several e-newsletters to ensure that the e-newsletter is distributed to national committees and other stakeholders in their respective countries.

Table 3 Members of the SCS Project Partner Network and other organisations that receive the e-newsletter from the PCU each month.

SCS Project Partner Network	UN/Other Organisations
National Focal Points	GEF Secretariat
National Technical Focal Points	UNEP DGEF, EAS RCU, UNDP, FAO
Focal Points for Project Components	SEAFDEC Secretariat
Regional Task Force Members	ASEAN Secretariat
Demonstration Site Managers	SEAPOL
Local Government Officials	SEA START RC/SEA-RLC
Regional Experts	IW-LEARN

A “subscribe to the South China Sea project e-newsletter” function has been added to the homepage of the website. Any visitor to the website can use this function to be added to the e-newsletter mailing list. The September 2006 e-newsletter was e-mailed to 202 individuals and as of September 2007 it is mailed to 326. Each e-newsletter is also loaded to the SCS e-newsletter section of the website. This section of the website is accessed an average of 512 times per month.

The South China Sea “Blog”

A “blog” is a website, or part of a website, where entries are made in journal style and displayed in reverse chronological order; the term “blog” is a contraction of “web log”. Blogs are a popular feature of the Internet, and are especially useful for publishing brief, informal pieces of information online. The South China Sea blog has been developed to provide the PCU and project partners with a facility for posting brief notices, news items, and articles on the project website. As soon as a user posts a new entry in the South China Sea blog, a link to that entry appears in the “Latest Information” section on the homepage of <unepscs.org>.

The “Blog” was instituted in November 2005 and subsequently a total of 58 entries have been made, all having been made by the PCU. As part of the obligations of trainees participating in the South China Sea Training Programme they are expected to contribute entries to the SCS blog. To date 48 individuals have been through an SCS Training Course and no contributions have yet been made to the SCS blog. In the case of the mangroves training course, trainees have used the mangrove e-forum as a blog reporting news, posting articles and photographs of national activities rather than simply focusing on the topics and threads listed for discussion under the e-forum.

Experience to date suggests that there is likely some confusion amongst members of the project network regarding the differences and similarities between “blogs” and “e-fora”. Since most users are more likely to visit and participate in online e-fora, and the e-forum software can be used effectively to meet the intended aim of the SCS blog, it may be of benefit to close the blog.

The South China Sea “RSS Feeds”

RSS stands for "Really Simple Syndication". It is used to easily and instantaneously distribute a list of headlines, updates, and other content from a website to a wide number of people. RSS works by enabling a website manager to maintain a notification list of content recently added to his/her website(s). This notification list is called an "RSS Feed" and Internet users interested in finding recent changes to a website can check this list. To assist with this task, computer programs called "RSS aggregators" have been developed to automatically access the RSS feeds of websites and organise the results in a way that can be easily accessed by users (see Figure 1), thus obviating the need to visit each website and check manually for recent additions..

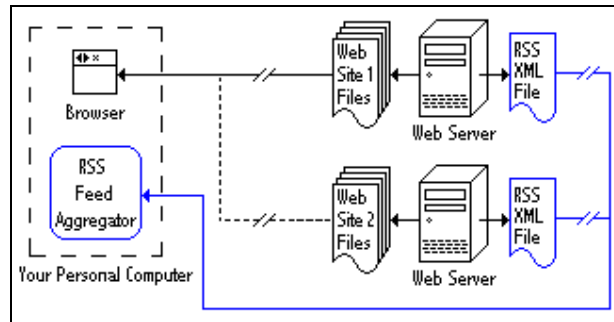


Figure 1 A schematic diagram illustrating the use of RSS feeds to automate the aggregation of links to new content on multiple websites.

RSS aggregators can be easily integrated into a webpage in order to automatically provide links to content as soon it is added to selected websites. To assist in the syndication of South China Sea project information, the PCU has established two SCS project RSS feeds for the website. The first feed syndicates recent “newsflash” items published on the homepage of <unepscs.org>, recent posts in the South China Sea blog, and recent versions of the SCS e-newsletter. The second feed syndicates recent versions of the SCS e-newsletter. These feeds can be accessed from the UNEPSCS RSS Feeds section of the homepage. All sections of the South China Sea project document repository now have their own individual RSS feeds that can be used to alert members of the addition of new documents to the website.

This technology is a highly powerful approach for the sharing of information online. Focal Ministries, Specialised Executing Agencies, and Demonstration Sites can use the SCS project feeds to have recent news from the SCS project displayed on their websites automatically. If the websites of these organisations also have RSS feeds, these feeds could be used to display recent information from these sites in a section of the project webpage. To demonstrate the use of RSS feeds, the main South China Sea project RSS feed is being “fed” into an RSS Feed Aggregator on the homepage of the website.

Despite the regular promotion of the South China Sea project RSS feeds, and the inclusion of RSS feeds from several partner institutions in the South China Sea project homepage the RSS feed is only being utilised by IWLEARN.net and not by other websites even those of the partner organisations. This experience is consistent with experience of the PCU in trying to encourage the project’s focal institutions and Specialised Executing Agencies to place links to the South China Sea project website on their organisations’ websites. Of the 415 inbound links to the South China Sea project website in September 2007, only four were identified as being the websites of organisations directly involved in project implementation.

Online “Helpdesk”

An online “helpdesk” tool based on Skype <www.skype.com> has been incorporated into the homepage of <unepscs.org>. Users can see if the PCU Officer responsible for the website is online and available to give assistance and can use this tool to receive quick, online assistance relating to the use of the website. This tool has been used successfully to help partners: locate documents and sections of the website; add data to the online meta-database; and make posts in the e-forum.

IMPROVING ACCESSIBILITY TO INFORMATION AND OUTPUTS FROM THE SOUTH CHINA SEA PROJECT

The South China Sea project has developed a wide range of outputs, that include databases, models, meeting reports and discussion documents, English and national language reviews of science and management, an extensive range of community education and awareness materials, national action plans, regional guidelines and reviews and knowledge documents such as this one documenting practices in the implementation of the project. In excess of 1,300 documents generated through the project are currently available on line and managing these and other outputs and improving their accessibility has required the development of a range of information tools including:

- South China Sea Document Repository,
- Online South China Sea Meta-Database,
- Online South China Sea Geographical Information System,
- Online Nutrient Carrying Capacity Model for the South China Sea,
- Online South China Sea Projects Database,
- South China Sea Multi-Media Centre,
- Catalogue of South China Sea Public Awareness Materials,
- South China Sea Photo Album,
- Fisheries *Refugia* Information Portal,
- South China Sea Training Portal, and
- South China Sea Project Google Earth Map Files.

The South China Sea Document Repository

The South China Sea Document Repository is being used to store 1,323 project documents and as a means to provide ease of access to, and the fast downloading of, meeting documents. It is possible for project partners to upload documents to the repository, although permissions are currently restricted to folders relating to demonstration site implementation. The document repository was re-developed during July 2007, to include RSS technology for each repository folder and file. This action was aimed at improving the ease of locating and retrieving individual documents by search engines such as Google and Yahoo. All documents were also renamed with key words included in the file names to improve the identification and retrieval of documents onsite, through the search functions of both the Joomla platform and the document repository module.

The Online South China Sea Meta-Database

The South China Sea meta-database was launched on the website in February 2006. This tool was developed in collaboration with the Southeast Asian Regional Learning Centre of IW-LEARN (SEA-RLC) and the Southeast Asian START² Regional Centre (SEA-START-RC).

The South China Sea meta-database provides a central online location for the collation and searching of meta-data regarding coastal habitats, fisheries, and pollution datasets in Southeast Asia. It is a “living” database that can be revised and updated online, providing scientists and managers with a tool they can collaboratively build and share within the region. Many databases developed as part of past environment and fisheries projects in the region have lasted only as long as the projects themselves. The SCS project has aimed to develop a tool that can be updated and managed by individuals within the countries, and hence continue to be used beyond the life of the project.

A total of 39 habitat, fisheries, and land-based pollution specialists within the region (all project component Focal Points and National Technical Focal Points) have been assigned rights to log in to the meta-database, edit existing metadata entries, and add new entries as new data sets become available. To date 8 individuals have loaded a total of 185 meta-data entries on-line. It is hoped that assigning responsibility for the meta-database to those working in the countries will assist in building the longer-term sustainability of the tool and provide an effective forum for peer-review of metadata entries.

² START = SysTem for Analysis, Research and Training initially of the International Geosphere Biosphere Programme of ICSU this is now co-sponsored by the Human Dimensions of Global Change Programme and the World Climate Research Programme.

The meta-database currently contains 1,279 entries, and the PCU has evaluated the quality of each entry and subsequently provided guidance to all project component focal points regarding how to improve the completeness and usability of their respective entries. The results of this review and the reports provided to each focal point are available for download from the SCS website and Meta-Database. An Instruction Guide for revising and adding data to the SCS Meta-Database is also available for download from the project website <unepscs.org> and has been distributed to network members on CD-ROM.

In addition to supporting the objectives of the SCS project, the SCS Meta-Database can, through customisation be applied to other projects and organisations. Such technology transfer not only avoids duplication of effort and wasted resources, but allows users to modify the system to meet their own specific requirements. The SCS Meta-Database Template can be installed and customised to run on Windows operating systems, and once installed, users can insert the logo of their respective organisation, and can change, add, and remove the countries and components to suit their needs. This Meta-Database Template provides a tool for the development of national-level databases in the context of the SCS project. To aid installation and customising, an instruction guide can be downloaded from <unepscs.org>.

The Online South China Sea Geographical Information System

The aim of the online South China Sea Geographical Information System (SCS GIS) is to provide a facility for the sharing and collaborative development of geographical data and information relating to coral reefs, seagrass, mangroves, wetlands, fisheries, and land-based pollution in the South China Sea and Gulf of Thailand. The SCS GIS has been in development by SEA START RC since 2002, and during the period August 2005-September 2006, SEA-RLC built an advanced query tool for data relating to key habitat sites. This tool is still under development, requiring improvements in terms of user friendliness but it was made available on <unepscs.org> in September 2006 for review and comments from project partners.

The simple query tool of the GIS database enables users to search information for individual coral reef, seagrass, mangrove, and wetland sites and the database itself contains the information collated during the characterisation of sites by the habitat working groups during the preparatory phase of the project. The search output is a complete site characterisation for the selected site. The advanced query tool provides users with a facility to search information on any/all site features for any/all sites in any/all countries. The output is based on the site features selected and provides useful data summaries for conducting comparative studies of sites.

The Online Nutrient Carrying Capacity Model for the South China Sea

The Online South China Sea Nutrient Carrying Capacity Model is a gridded (raster) based modelling system that links chlorophyll concentrations in specific locations of the South China Sea to land-based nutrient loading. The model runs entirely on Microsoft Excel (including data management, numerical solving, and geospatial visualization) and can be used to estimate the impacts of user-defined nutrient loading scenarios from all major rivers on the nutrient status of the South China Sea. A comprehensive user guide outlining the procedures for (a) downloading model data from the South China Sea project website, (b) running the model, and (c) modifying nutrient loading scenarios is readily downloadable from the nutrient model section of the South China Sea project website – http://www.unepscs.org/nutrient_model/.

Projects Database

During the preparatory phase of the South China Sea project, project component focal points compiled information on past and on-going coral reef, seagrass, mangrove, wetland, fisheries, and land-based pollution projects implemented in areas of the South China Sea and Gulf of Thailand. The projects Database provides a facility for the efficient online storage and searching of this information online. The database can be searched by country, project focal area, and project size, and includes data fields such as contact details for project managers, project objectives and activities, and financial and other resources available to individual projects. The projects Database is a “living” database. Network members can revise and edit existing information in the database via a secure online login, and can easily add information about new projects as it becomes available.

The South China Sea Multi-Media Centre

The PCU has developed a video library of demonstration site activities, sustainable capture fisheries, and the coverage of project activities in TV news. A total of 23 project videos, with a total running time of approximately 3.5 hrs were available for viewing on <unepscs.org> in September 2007. All videos were compressed and converted to the web-friendly Windows Media Video format for ease of online access, and are easily viewed on most broadband Internet connections. It is aimed that all additional multi-media outputs produced through demonstration site and pilot projects, training courses, and regional conferences and meetings will be made available on <unepscs.org> during 2008. A Multi-Media Centre has been established on <unepscs.org> to enable the online viewing of these important project outputs.

South China Sea Online Public Awareness Centre

In order to enable the regional sharing of public awareness materials developed as part of the UNEP/GEF South China Sea project, an online catalogue of public awareness materials on the sustainable use of the coastal habitats and fisheries of the South China Sea and Gulf of Thailand was established on <unepscs.org> during May 2007. It is aimed that this catalogue will act as a useful tool for coastal and marine scientists and managers in countries bordering the South China Sea in the development of effective community awareness and capacity building programmes. The catalogue contained a total of 40 posters in both low and high resolution formats during September 2007, and is being expanded to accommodate new project outputs as they are received by the PCU. On 31st September, two South China Sea project public awareness posters featured in the top 10 of an image search on the "South China Sea" using the search engine "Google".

The South China Sea Photo Gallery

A collection of 1,053 photographs from regional meetings, demonstration sites, and national level activities associated with the implementation of the South China Sea project were uploaded to <unepscs.org> from April-July 2007. All photographs were optimised for ease of downloading and viewing at most computer monitor resolutions, and branded with the South China Sea project logo and website URL. This has acted as an effective tool for attracting new visitors to <unepscs.org>, with "Google Images" <<http://images.google.com/>> directing 1,825 visitors to the project photo gallery during the month of September 2007.

The Fisheries *Refugia* Information Portal

The Regional Working Group on Fisheries has identified a network of 14 sites to be included in an initial system of fisheries *refugia*. In mid-2006 it was agreed that a simple online mapping system showing: geographical information about the habitat demonstration sites; known inshore nursery and spawning areas of significant transboundary fish species; and currently managed areas in the South China Sea and Gulf of Thailand, would greatly enhance the work of this group.

A simple and user friendly Google Earth Mapping system <<http://refugia.unepscs.org>> has been developed to represent information about *refugia* sites in the South China Sea and Gulf of Thailand. This tool has recently been integrated into a web portal that will act as an information portal in support of the project activity of establishing a regional system of fisheries *refugia*. This mapping system is supported by a user friendly and intuitive online tool for adding new sites and revising information about sites online. Fisheries component focal points and staff of SEAFDEC can use this tool for adding and revising site information from their offices.

South China Sea Training Portal

The Regional Scientific and Technical Committee developed the South China Sea Project Training Programme with the aim of strengthening capacity within project network to guide the long-term sustainability of South China Sea Project interventions. The South China Sea Training Portal was established on the project website in support of the co-ordination of the training programme. The portal has been used to: guide partner organisations in the preparation of training course proposals; inform network members of key developments and events (specifically the timetable of training courses); and to share contact detail information for the individuals nominated by the project's National Technical Focal Points to participate in the regional training workshops.

The portal will act as a repository of all training materials developed as part of the programme. The portal is also linked to the SCS “blog”. It is expected that trainees will use the “blog” to share information about: the implementation of the national “echo” training seminars; and how the regional training courses have improved their capacity to guide the sustainable use of coastal habitats and resources of the South China Sea region. Experience to date suggests that the e-forum may be more suitable for this purpose than the blog.

South China Sea Project Google Earth Map

Google launched Google Earth <<http://earth.google.com>> in 2005. The technology was first introduced to the SCS partner network during the 2005 round of working group meetings (July – September) and was discussed briefly during the project’s second Regional Scientific Conference (November 2005). The potential uses for Google Earth identified at this time included the validation of information regarding the extent of habitats (particularly mangroves and wetlands), estimating the numbers of small fishing vessels in remote coastal areas and the extent of mariculture activities in coastal areas, and general coastal use planning.

Since then Google Earth has been downloaded by more than 200 million Internet users and has drawn more installations than Microsoft’s Windows XP operating system³. This free online mapping and geographical information system has been used by a multitude of organisations, including the United Nations Environment Programme, the World Wide Fund for Nature (WWF), and the World Conservation Union (IUCN) to make information regarding their respective programmes and projects readily available on the “Global Awareness” and “Geographic Web” layers of Google Earth.

During October 2007, the PCU developed a South China Sea project layer for inclusion in Google Earth. This layer contains information regarding the project’s network of Focal Ministries, Focal Ministries, habitat demonstration sites, and pilot activities. Each of the sites characterised as part of the project’s habitat demonstration site selection process of the project have also been included in the layer. The aim of this initiative is to improve access to South China Sea project information and outputs via Google Earth.

USAGE OF THE SOUTH CHINA SEA PROJECT WEBSITE AND INITIATIVES TO ENHANCE THE ONLINE VISIBILITY OF PROJECT ACTIVITIES AND OUTPUTS

The Webalizer and AWStats software packages were used to monitor South China Sea project website usage for a one year period from 1st October 2006 – 31st September 2007. The purpose of this was to provide insight into the effectiveness of the website in terms of improving: accessibility of South China Sea project outputs and information; the online visibility of project activities; and the online sharing of information and experiences among members of the network.

A total of 242,400 unique visits were made to the website <unepscs.org> during the one year period from 1st October 2006 – 31st September 2007. The daily average number of visits and pages accessed during this same period were 664 and 3749, respectively. Users accessed an average of 5.65 pages per visit during the year (Table 4).

Numbers of Visits by Country

The 242,400 visitors to the site over the year were located in 119 countries. All seven countries participating in the project featured in the top 20 countries in terms of the number of visitors to the site during the year (Table 5). This is particularly impressive for Cambodia where only 0.3 percent of the total population is reported to have access to the Internet. The presence of the other six participating countries in the top twenty visiting nations perhaps reflects the large growth in the number of regular Internet users in the Southeast Asian region. Growth in number of Internet users for participating countries has ranged between 300% (Malaysia) and 8,510% (Viet Nam) during the five years the South China Sea project has been operational (Table 6).

³ (CNET 2007) Google Earth users outnumber Brazil’s population. CNET News.com <http://www.news.com/8301-10784_3-9726543-7.html>

Table 4 The daily average and monthly total number of unique visitors and number of website pages viewed during each month of the period 1st October 2006 – 30th September 2007.

Month	Unique Visitors		Page Views	
	Daily Average	Monthly Total	Daily Average	Monthly Total
Oct 2006	206	6,387	2,284	70,815
Nov 2006	196	5,888	2,142	64,263
Dec 2006	317	9,812	2,310	71,616
Jan 2007	403	12,498	2,329	72,206
Feb 2007	407	11,382	4,641	129,942
Mar 2007	504	15,627	4,947	153,346
Apr 2007	632	18,972	5,058	151,735
May 2007	725	22,475	4,142	128,406
Jun 2007	1,036	31,091	4,479	134,360
Jul 2007 ⁴	1,451	44,978	5,972	185,130
Aug 2007	1,101	34,134	3,500	108,514
Sep 2007	972	29,156	3,271	98,141
	Total	242,400	Total	1,368,474

Table 5 The number of unique visitors from the main countries from which <unepscs.org> was accessed between 1st October 2006 – 30th September 2007.

Country	Country Code	Unique Visitors ⁵	Percent Total (%)
United States of America	us	133,498	55.1
Netherlands	nl	20,562	8.5
Australia	au	16,569	6.8
Thailand	th	14,434	6.0
Hong Kong	hk	6,960	2.9
China	cn	6,219	2.6
Malaysia	my	4,656	1.9
Canada	ca	4,502	1.9
Indonesia	id	4,036	1.7
Viet Nam	vn	2,935	1.2
Philippines	ph	2,210	0.9
Japan	jp	2,133	0.9
Italy	it	1,920	0.8
Germany	de	1,868	0.8
Great Britain	gb	1,833	0.8
Cambodia	kh	1,274	0.5
Singapore	sg	1,236	0.5
Russian Federation	ru	1,210	0.5
Panama	pa	1,146	0.5
Others (99 countries)	-	13,200	5.4
		242,400	100

⁴ The high visitor numbers and numbers of page views for July 2007 might reflect a continuing period of overload on the South China Sea project web server associated with the use of the "Linkchecker" program to check links on <unepscs.org> run from locations in Thailand and the United States of America.

⁵ Data contained in this table should be treated with caution since information regarding the origin of visitors to websites is collected from the Internet Protocol (IP) addresses of the visitors' Internet Service Providers (ISP). During the development of the Internet in the early 1990s, most IP addresses were assigned to the United States, and have subsequently been reallocated to emerging Internet markets over the past five years, especially in Southeast Asian countries. Most "IP to country databases" have a 90 percent success rate in identifying the true location of reallocated IP addresses, but the "US" country code is still assigned to some IP addresses and not the country to which it has been reallocated. This results in higher than actual numbers of IP addresses being assigned to the United States.

Table 6 Internet usage and internet use growth in countries bordering the South China Sea during the implementation of the UNEP/GEF South China Sea project. Population and Internet usage data sourced from the “*The World Factbook*” <<https://www.cia.gov/library/publications/the-world-factbook/>>, and internet use growth data sourced from the Internet World Stats: Usage and Population Statistics <http://www.internetworldstats.com/>

Country	Population	Number of Internet Users	Population Penetration (%)	Internet Use Growth (2000-2007) (%)
Cambodia	13,995,904	44,000	0.3	633.3
China	1,321,851,888	137,000,000	10.4	620.0
Indonesia	234,693,997	16,000,000	6.8	900.0
Malaysia	24,821,286	11,292,000	45.5	302.8
Philippines	91,077,287	4,615,000	5.1	600.0
Thailand	65,068,149	8,466,000	13.0	268.1
Viet Nam	85,262,356	14,684,000	17.2	8,510.4
	1,836,770,867	192,101,000	10.5	

Numbers of Visits by Duration and Content Accessed

In terms of time spent on the site by each visitor, 18.3 percent of users spend more than 15 minutes on the site, with nearly seven percent accessing site content for in excess of 1 hour. In contrast, 35 percent of users leave the site within 30 seconds of having loaded the homepage (Table 7). Experience during the periods April-June 2007 and July-September indicate that regular additions of diverse website content and promotion of such content in the “UNEPSCS Highlights” of the homepage is an effective means of increasing the number of visitors moving through the site rather than immediately out, after having arrived. Re-development and promotion of the South China Sea document repository, and establishment of the online multi-media library and catalogue of community awareness materials during the June-July period, led to marked increases in the number of visitors accessing these parts of the site during the third quarter of 2007.

An important outcome of these developments has been a significant decrease in the number of first time visitors accessing less informative or content rich parts of the site (Table 8). Similarly the total number of document downloads from the website during 1st October 2006 – 30th September 2007 was 23,913. Notably the South China Sea knowledge documents on “Managing Multi-Lateral Intergovernmental Projects and Programmes” (uploaded on 18th April 2007) and “Procedure for the Selection of Habitat Demonstration Sites” (uploaded on 26th July 2007) have been downloaded 475 and 366 times, respectively, since their uploading to the document repository. Similarly, the four regional habitat reviews published during the preparatory phase of the project had collectively been downloaded 1,982 times since their uploading on 23rd August 2006.

Table 7 Duration of visits to the South China Sea project website during the period 1st October 2006 – 30th September 2007.

Duration of Visit	Number of Unique Visits	Percentage of Visits
0sec-30sec	84,840	35.0
30sec-2min	34,421	14.2
2min-5min	30,300	12.5
5min-15min	48,480	20.0
15min-30min	8,484	3.5
30min-1hr	20,846	8.6
1hr+	15,029	6.2

Table 8 The sections of website that were accessed first by most new visitors to the homepage of <unepscs.org> between October 2006 – September 2007.

Site Feature	Oct-Dec 2006 (%)	Jan-Mar 2007 (%)	Apr-Jun 2007 (%)	Jul-Sep 2007 (%)
Demonstration Site Pages	22.2	20.2	17.6	19
GIS and Meta-Database	15.0	13.3	10.0	8.2
Regional Working Group and Task Force Pages	10.9	10.7	9.0	9
South China Sea Documents	13.1	10.0	14.1	18.5
South China Sea Project E-Forum	8.0	9.8	8.0	11.0
Fisheries <i>Refugia</i> Informational Portal	4.8	8.0	12.4	11.2
Training Programme Portal	2.0	1.0	2.0	2.0
Community Awareness and Video Library	0.0	0.0	7.9	14.1
Other	24.0	27.0	19.0	7.0

Online Visibility

Website “traffic” (or numbers of visits) can be categorised by of three sources. The first being “direct traffic” which refers to individuals arriving at the site after having entered the site’s URL (i.e. <http://www.unepscs.org>) into their web-browser and loading the web-page. The second is traffic from “referring sites” which involves visitors arriving at the site after having clicked on a link to the website placed on another website. The third is traffic from “search engines”. Search engines, such as Google and Yahoo, are information retrieval systems designed to assist in finding information on the Internet and can be responsible for a large percentage of overall traffic to an individual site.

With the aim of building the online visibility of the South China Sea project, as measured by number of visitors and ranking of search results for relevant search terms including “South China Sea”, combination of habitat type and countries, and demonstration site names, the PCU implemented initiatives to improve the ease of searching and ranking of <unepscs.org> by main search engines. The specific constraint addressed by the PCU was the use of non-Search Engine Friendly URLs by the Joomla Content Management System. Standard HTML web sites are designed such that the URLs for each page reflect the meta-description and content for the pages, and include key search words for the website.

The standard URLs used by Joomla provide for little control over URL key words, and are presented to search engines and users as follows:

- http://www.unepscs.org/index.pgp?option=com_content&task=view&id=16&itemid=55.

In order to enable the use of key search terms in URLs for <unepscs.org>, installation of a component to re-write the Joomla style URLs to be search engine and user friendly was undertaken in the first quarter of 2007. The hierarchical structure and linkages between key sections of the site were also redesigned at this time with the aim of improving the indexing of pages by search engines. The result of this action was that URLs for each page of the site now contain meaningful keywords that relate to the site’s key sections, menus, and content items. An example of a re-designed URL is as follows:

- http://www.unepscs.org/Fangchenggang_Mangrove_Habitat_Demonstration_Site_in_China.html

The Joomla files were also re-coded in order to optimise output and to obtain higher keyword densities in each of the individual pages. The site’s main RSS feed was also re-developed to include content items added to the site’s “blog”, front page, and project e-newsletter. In addition to its’ potential usefulness in syndicating project news, the inclusion of the RSS feed on the site ensures that new content is indexed and becomes searchable by search engines promptly after addition to the site.

During the second quarter of 2007, the PCU re-developed the site’s document repository and multi-media library to include: project documents (1,323 project documents), 23 project related video clips, 40 public awareness posters, and a gallery of 1,053 South China Sea project related photos. All new content items were named using keyword dense filenames to improve search engine ranking. This has led to an approximate 6-fold increase in the total South China Sea related content indexed as part of <unepscs.org> by search engines Google, Yahoo, and MSN.

This combined strategy of improving the search engine and user friendliness of URLs, combined with a substantial increase in the “content richness” of the site has enhanced the overall online visibility of <unepscs.org> significantly. On 30th September 2007, <unepscs.org> ranked ninth from 36,000,000 web pages indexed by Google.com for the keywords “South China Sea”. At the same time in 2006, <unepscs.org> did not rank in the top 100 pages of Google search results for the same keywords. This has resulted in a substantial increase in web traffic directed to <unepscs.org> by key search engines during the period 1st October 2006 -30th September 2007 (Figure 3).

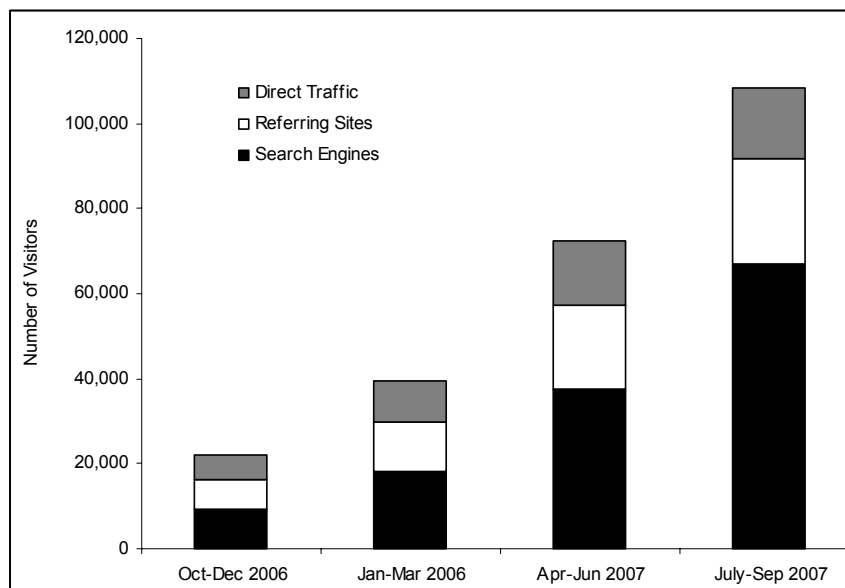


Figure 3 Number of visitors by source (direct traffic, referring sites, and search engines) during the period 1st October 2006 – 30th September 2007.

EXPERIENCES AND LESSONS LEARNED IN INFORMATION AND DATA MANAGEMENT

The achievements of the UNEP/GEF South China Sea project in terms of information and data management are significant in terms of:

- The volumes of regional information and data compiled to date;
- Commitments from coastal and marine scientists and their institutions to maintain and update regional databases with new and additional data as it becomes available; and
- The establishment of an effective platform for regional sharing of information and experiences online via the South China Sea project website.

Capitalising upon these achievements and sustaining existing databases and information tools for the longer-term benefit of transboundary waters management in the South China Sea and Gulf of Thailand represents a critical challenge to the participating countries of the UNEP/GEF South China Sea project. Project experiences suggest however, that there is a need for improved data management and security, as well as enhanced capacity for the wise selection and development of user-friendly and intuitive information tools. This is highlighted by the following two experiences and associated lessons learned.

Improving Data Management and Security

Until October 2005, the South China Sea project website was hosted on a Windows server maintained by SEA START RC in Thailand’s Chulalongkorn University. In the final quarter of 2005, SEA START RC undertook to host the project website on a Linux server. Linux servers were then and still are preferred for hosting websites as they are more secure and can handle significantly more requests (visits, downloads) in a given time than a Windows server using the same hardware. Linux accounts for approximately 85-90 percent of all web servers worldwide.

Following the launch of the new project website in November 2005, the complexity and size of the project databases grew significantly. Due to difficulties associated with downloading complete back-ups of the database remotely from the PCU office, it was agreed that SEA START RC would make and store regular backups of the project website directly from their server. No protocols for database backup and storage were discussed or agreed by the PCU and SEA START RC, and it took a subsequent hardware failure and loss of the main “.sql” file for the South China Sea project website for greater attention to be placed on the development of such protocols within the framework of the South China Sea project.

The hardware failure appeared to be caused by the use of an old (approximately 5-year-old) hard disk drive (HDD) for the storage of the website database at SEA START RC. Discussions with individuals involved in information and data management for coastal and marine environment and resource management within the region suggest that many organisations continue to operate in such a manner, with makeshift equipment and inappropriate protocols for data back-up and security. Unfortunately, SEA START RC had only been making incremental back-ups, with no full backup of the website's main database for six months. The cost to the PCU was approximately 200 hrs of time involved in restoring the website from the 6-month-old back up.

It was decided to have the website hosted on a commercial Linux server in order to assess what areas of the site would require re-development with content back-ups made by the PCU. All post-February 2006 work was lost, and nearly all major internal links were broken and all permissions reset. Several days were spent fixing these major structural problems with the site and subsequently the name-servers for the domain unepscs.org were directed to the IP address of the commercial server. This restored users with access to the site. The server host sent daily backups to the PCU on CD during the initial three weeks involved in re-developing the site. Full back-ups were made each day and saved on two back-up drives. The host now maintains complete daily, weekly, and monthly back-ups, and now sends a complete and tested back-up of the website to the PCU each week. Databases are currently also set up from the most recent back-up on a second test web server to ensure back-ups are functional.

The key lessons learned from this episode relate to the need to ensure that all data and databases be housed at a secure data centre, safe from power failure, heat, fire, and humid conditions. The use of hardware designed for personal computers, and especially old, second hand HDDs, should not be used for the storage of any project related data under any circumstances. Complete daily back-ups of all data should be conducted and saved to a dedicated back-up HDD, and be burnt to DVD once a week and stored in a secure location. Back-up DVDs should be checked with an MD5 hash to ensure no data corruption occurs during the download or burning process. Websites and databases should be set up from most recent back-ups on a test server to check that databases are being backed-up correctly.

Whilst rebuilding the South China Sea project website, it was not possible to determine how regularly the online South China Sea Meta-database, also hosted at that time within SEA START RC, was being backed up. It was noted however, that the folder <http://metadata.unepscs.org/phpmyadmin> was not “.htaccess” protected, providing direct access to the administration area of this database to anyone. It was subsequently decided to have this valuable regional information tool hosted by a professional server provider.

Development of User-Friendly and Intuitive Information Tools

It is currently standard coding practice to ensure the cross-platform compatibility of scripts used to run applications such as the SCS Meta-Database, i.e., the script should work on both Windows and Linux servers. Windows servers are not case-sensitive whereas Linux servers are. A review of popular coding texts suggests that it is poor practice to rely on Windows' lack of case sensitivity when coding for database (or any) applications, as an application that works on a Windows server will likely not work on Linux.

When the PCU installed the meta-database on the commercial Linux server used to host <unepscs.org> the first problem noticed was database queries that attempted to query non-existent fields in the tables. The main incompatibility with Linux servers became apparent when testing the revision and addition of data to the meta-database. These actions created errors for registered users,

such that it was not possible to either add or, revise entries in the database from the front-end interface. This led to a close analysis of the script, which enabled the identification of a range of critical problems, the most important being the lack of consistency in the capitalisation in the script.

The script contains 0.5 megabytes, or approximately 12,000-15,000 lines of code. The identification and resolution of each of these problems would likely take an experienced programmer 2-3 weeks, and would be complicated by a range of other “bugs” in the script. The PCU identified areas where the programmers of the SCS Meta-Database script have used “hacks” in an attempt to fix bugs, but attempts to decipher the code are restricted as no comments have been included in the code. The key problem with this is that it would be extremely difficult for a programmer to understand the functionality of the script, and then to customise the script. In fact, it would perhaps be easier for a programmer to rebuild the application properly rather than attempting to interpret any of the code.

The meta-database is also characterised by the heavy use of “Microsoft only” client side scripting which may hinder those using the application with web-browsers other than Microsoft Internet Explorer. There appear to be minor problems with how browsers such as FireFox, Opera, and Knqueror display the site. The SCS Meta-Database is a valuable output of the South China Sea project and can be built upon beyond the life of the project. The existing coding problems should be resolved in order to minimise future problems associated with the increasing use of Linux-based servers and to reduce the occurrence of “bugs” in the application that may reduce user confidence in the tool in the longer-run. These experiences with the development and use of the online South China Sea Meta-database should be considered in the future development of information tools.

CONCLUSION

The project document envisaged that the data and information management outcomes of the project would simply be national and regional meta-databases for each project component and sub-component. The project document did not envisage development of a project website nor development of a regional GIS database for the South China Sea. What has resulted from the project is an interactive project website using component management software that supports:

- South China Sea Document Repository;
- South China Sea Meta-Database that can be added to by network members online;
- Meta-database template that can be downloaded for use by other projects and or institutions;
- Online South China Sea Geographical Information System that can be added to by network members online;
- Nutrient Carrying Capacity Model for the South China Sea that can be downloaded and run on a desk top computer for the entire basin or selected portions thereof;
- South China Sea Projects Database that can be added to by network members online;
- South China Sea Multi-Media Centre;
- Catalogue of South China Sea Public Awareness Materials;
- Fisheries *Refugia* Interactive Mapping Tool.

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