Databases in the East Asian Seas Region and the Need for Enhanced National and Regional Access

Hugh Kirkman[1]*, Judith Kirkman

5a Garden Grove, Seaholme
Victoria 3018 AUSTRALIA
hughkirkman@ozemail.com.au

Abstract

Comprehensive marine and coastal databases are essential for management of the seas of East Asia. Maps of resources found in marine and coastal environments, the sources of potential damage and data to guide managers are the means by which resources can be assessed and managed to maintain marine resources.

This paper describes the uses of databases, their contents and the problems of accessing data and information. The concept of metadata, which are data about data, is explained. Some of the advantages of metadata bases are pointed out and ways to overcome some of the problems of inaccessibility of data are discussed. Freely available and accessible data are keys to regional and national marine and coastal management. The current situation in terms of publicly accessible data is described through a compilation of online databases, metadata bases and information systems for marine and coastal environmental reporting in East Asian Seas. The other presenters in this seminar are briefly introduced.

Keywords: database, metadata base, monitoring, management, mapping

[1] * Corresponding author

Introduction

There is a strong need for data for managers to manage, conserve, remediate, recover and sustain continued use of East Asian coastal and marine resources. This need is met by inspired, knowledgeable and scientific use of data. This paper describes data, and discusses the use and importance of databases, metadata and metadata databases. Also, the importance of monitoring, mapping and management is considered.

Currently there are many global databases including global datasets of a general nature. There are also several national databases that are more specific, but access to the information in many of these databases is difficult from an international perspective primarily because of the language barrier. However, there are few regional databases and the existing ones include limited sets of data and information, often collected under the umbrella of the hosting organization. It is very difficult to get a comprehensive overview of which data and information are readily available from public sources at global, regional and national levels and this makes it difficult to assess data and fill information gaps. There is also very little information providing an overview of past or on-going project activities in the region and the lessons-learned from these activities. Likely reasons are the difficulties in collecting such information and the need for regular verification and updating. In addition, no organization has taken the responsibility, or has been given the mandate, to collect and coordinate information on activities under the various organizations and programmes operating in the region.

Data and Information

Coastal and marine environmental data and information have many forms including video, documents, text, numbers and maps. All of which cost a lot of money and time to collect making data sets unique and valuable assets. Change is traced by comparing historical data with current data. Often historical data are not catalogued and sometimes almost forgotten. Historical data sets cannot be duplicated. Data, when collected, are about time and place and no data set can be collected again (Kirkman, 2001). Usually coastal and marine data are obtained by monitoring, mapping and setting up inventories of abundance and diversity. When compiled and analysed to provide holistic overviews of existing situations, these data allow informed management decisions. Management decisions not based on accurate data are guesswork.

Data are used by scientists to report to managers on actions that have taken place, on circumstances when no action was taken and the effects of actions that are currently taking place. This was formalised in a definitive paper by Underwood (1993) who showed how repeated measures models can be used to detect many types of impact that are not identifiable, using Before/After/Control/Impact (BACI) sampling.

Data tell us of past events, inventories, and occurrences. Data can be used to predict future events and scenarios with predictive models. Geographic Information Systems require data for their operation including mapping and modelling. Data are resources that enable scientists and policy makers to make decisions on how to manage changes. They record evidence of degradation, remediation, recovery, natural recovery and fisheries catch data.

For management of marine systems monitoring is essential. Although it is not treated with great priority by governments, the state of the marine environment cannot be mentioned without the facts made available by monitoring. Every aspect from water quality to erosion, to noise on beaches and plant and coral health must be monitored before any statement can be made about them. Monitoring provides data and these are deposited in databases. Years from now managers will want to know what grew where, where sea boundaries were and the resource use that occurred. Mapping of marine resources in GIS overlays is also essential for resource management. Some organisations and governments need assistance in developing these databases from data generated by mapping and monitoring. Capacity in mapping and monitoring may need to be enhanced to generate worthwhile state of environment reporting.

It is essential that users know the reliability and accuracy of the data. Some uses of data may require high degrees of accuracy and reliability especially if being extrapolated. Other uses may require only “ball park” figures. Often data from reports rather than original data are used. The data presented in reports, scientific papers etc. have been summarised, filtered and interpreted. However, over time, scientists gain new insights and interpretations about a particular issue using the original data for re-analysis, e.g., in the original interpretation of the data about the hole in the ozone layer outliers in the data were considered just that. In fact, these outliers, when analyzed later, were the first indications of the hole.

The more datasets are used and shared the more errors, omissions or flaws in those datasets or databases can be found, e.g., recently some maps and tables were produced which showed no loss in the area of seagrass in Port Philip Bay, Melbourne, Australia. The inferences from this were used by many to show a stable seagrass coverage but recently a scientist checked the calculations made in the tables and found the authors were out by a large factor and the area of seagrasses had in fact been reduced.

Metadata

Metadata are data about data. Information about data includes its reliability, precision, frequency, time frame, position (nowadays with GPS position), collector, methods of sampling, and availability. Metadata should also include whether the data are available on the web and information about their accessibility. Metadata also describes the data format. International standards (ISO 19115:2003) for metadata were set a few years ago and should be used where possible. These standards contain a large number of fields but it is not mandatory to fulfil all the fields, although, the minimum set of metadata required to serve the full range of metadata applications (data discovery, determining data fitness for use, data access, data transfer, and use of digital data) should be used. In an ideal world no data should be collected without first metadata being prepared.

Metadata are about past and present data for the future. They are not the data or summary data, e.g., tables from reports, journals or proceedings, these summaries contain no information as to the quality of the data, are not often the

primary data source and the resolution of the initial data has been lost during successive summaries. Summaries are often subject to interpretations.

Data are not always available and sometimes data holders are not willing to hand out their data without charge. Data may be sensitive and the owners unwilling to hand them out, yet these data exist. Some data sets are incomplete or consist of unfinished collections and data may not always be on computers. Sometimes it is very difficult or completely impossible to put them into a database. Metadata can also be used to describe these types of data, giving evidence of their collection and where to find them. These difficulties and the desire of each organisation to have its own database mean that data are disparate, difficult to obtain and often not accompanied by any quality control. Research and management may be compromised through lack of knowledge of data quality.

Databases

Once data are collected, one challenge is to store and to access them in an effective manner. Much has been attempted in the past to develop national or regional databases but no “one-stop-shop” has resulted on the national or regional scale. This statement may seem to conflict with the results of an initial internet survey which identified 55 existing databases related to the coastal and marine environment (see Annex 1). Twenty eight of these were global, there were six UN based databases, and eight regional and 13 national databases were also identified. However, none of these could be described as a “one-stop shop” for data and it is both time consuming and confusing to have to look into a

large number of different databases when trying to obtain data and facts about a particular marine or coastal issue. Admittedly many of the identified databases have been established for different purposes, but often the data or subjects in them are overlapping and sometimes identical.

There is a major investment in data collection and this investment must be managed. All databases have to have dedicated staff to update them and they mostly require passwords and an internet search to find them. Furthermore, updating or adding data requires more passwords, searches and time spent getting data into the correct format. Yet, sourcing databases to obtain data to assist with management is the basis to all decisions about the environment.

Databases were established and achieved their local and parochial goals, but there is much more to data than just using it to solve local and current problems. Data may be used in the future for quite unseen and unforeseeable purposes so they must be archived in such a way as to give future generations their use. Meetings, forums, and conferences have been convened to discuss national or regional databases, but still no real progress towards a regional database has been achieved. The expense of implementation and maintenance is often too much or no commitment can be made for funding into the future. No one wants to be the first to establish such a database nor is anyone confident enough to guarantee all data are on it. Many owners are reluctant to release their data or further still give their data away. Furthermore, many sets of data are incomplete and need renovation to prepare for computer storage.

Metadata contain the description and location of data and a regional metadata database would be a venue where participants can advertise the existence of their data, gain recognition for their organisation's scientific expertise and, at an international level, support internal agreements and conventions. Such a database would consist of "Descriptive information that characterizes a set of quantitative and/or qualitative measurements and distinguishes that set from other similar measurement sets". (Lola Olsen, Global Change Master Directory, http://gcmd.gsfc.nasa.gov/about_us/mission.html)

A metadata database was begun in 2001 at SEA START in Bangkok (Kirkman, 2001) but a dedicated curator of the metadata was never appointed and the metadata was absorbed into the UNEP/GEF South China Sea Project.

Use of Data

As mentioned earlier, management is not possible without accurate data. Managers rarely have the opportunity to examine datasets but rely on scientists to analyze the data. The data may be summarized to provide direct information or synthesized with other data to provide overall information about the marine and coastal environment. The managers then use the processed data to determine activities that are needed to sustain, remediate and conserve environmental conditions.

As distinct from managers, policy makers rarely have the opportunity to examine analyzed or even synthesized data results. They take information and advice from managers and scientists and form the relevant policies. State of the Marine Environment reporting is carried out regularly and frequently to examine

the effects of changes brought about by management and policy decisions and to determine further changes if necessary.

UNEP supports assessments of environmental conditions and trends including building the capacity of its many partners to generate the information necessary for sound environmental decision making to support sustainable development and the achievement of the Millennium Development Goals.

Seminar on Integrated Coastal and Marine Information Management

The speakers in this seminar will discuss the development of databases in the East Asian Seas region ranging from regional to national coverage. Some include specific monitoring data, such as marine biota and water quality, while others cover a more diverse range of information related to the management of coastal and marine resources.

- Indonesia has a marine and maritime database serving a large variety of requirements. The Southeast Asia Center for Ocean Research and Monitoring is a distributional centre for marine data.

- Biological monitoring is discussed in a paper from collaborators from the Department of Marine Science, Kasetsart University in Thailand and the UK. From lessons learnt after the tsunami, they advocate routine sampling of the condition of the sea and coastal biota. The collaborators have undertaken a series of collaborative projects to build capacity in Thailand to undertake biological surveys.

- Again, after the tsunami a need for sharing information and better coordination between agencies became apparent. IUCN has established a

regional information hub working in Sri Lanka and Thailand. The electronic database hub holds information on technical experts, technical references, and interventions and lessons learned from environmental aspects of the post-tsunami rehabilitation, and coastal reconstruction.

- A review of fisheries information and data in Southeast Asia is given and more innovation advocated in its use and availability. Standardization and harmonization of statistical standards are discussed to facilitate sharing of expertise and data. There is some improvement required in data and information collection and their use.

- A presentation on the environmental information resources for management of Southeast Asian waters is made by the Southeast Asia Regional Learning Centre. The online information resources support transboundary waters management in Southeast Asia by collaborating with other projects that providing a metadata database and databases.

- The UNEP East Asian Seas Regional Coordinating Office has initiated the development of a “one-stop-shop” Knowledge-Base for accessing data and information on the coastal and marine environment. Its twofold development is for a regional database on existing programmes, projects and activities and for a pilot national database on the marine and coastal environment.

- The Vietnam National Database is described and the need for an organization to focus on information sharing and making accessible information

at a local and national level is explained. The difficulties arising from this project are explained and collaboration with partners guarantees success.

Conclusions

Data take time and money to collect and are extremely valuable resources. They affect coastal and marine management decisions and need to be stored and shared. In order to make best use of the efforts undertaken in the East Asian Seas region, increased collaboration between existing projects and programmes would be beneficial in order to increase data accessibility and address information gaps at national and regional levels. This collaboration may well start with increased information sharing and networking between regional organizations, governments, organisations, universities and existing database initiatives through further developing mechanisms such as the East Asian Seas "one-stop-shop" Knowledge base and the SCS Project's metadata database.

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References

Kirkman J. 2001. SEAMCAT: A metadata catalogue to assist the conservation and management of East Asian marine coastal ecosystems data. In: UNEP Proceedings of the International Symposium on Protection and

Management of Coastal Marine Ecosystems. Bangkok, Thailand, 12–13 December, 2000. EAS/RCU, UNEP Bangkok, Thailand 2001. p. 266–269.

Underwood, AJ 1993. The mechanics of spatially replicated sampling programmes to detect environmental impacts in a variable world. Australian Journal of Ecology, 18, 99-116.

Annex 1.

An overview of online coastal and marine environment related databases, metadatabases and information systems

Compiled by:

Richard T. Cooper

Southeast Asia Regional Learning Centre,
c/o Southeast Asia START Regional Centre,
Chulalongkorn University, Bangkok, THAILAND
rcooper@iwsea.org

Srisuda Jarayabhand and Birgitta Liss

East Asian Seas Regional Coordinating Unit (EAS/RCU)
United Nations Environment Programme
Rajdamnern Avenue, Bangkok 10200 THAILAND

Global coverage:

Organisation	Name of database /information system	Focus of database/information system	Website address
United Nations	UN Atlas of the Oceans	Information relevant to the sustainable management of the oceans, including maps, statistics and databases, websites, and news accessible through four main links: - About the oceans; - Uses of the oceans; - Issues; - Geography.	http://www.oceansatlas.org
	Commission on Sustainable Development - Water Action Network Database (CSD WAND)	A web-based platform to: - exchanging best practices, lessons learned, and case studies; - online expert network; - tool for searching international agreements on water and sanitation.	http://www.csdwand.net/
UN Population Division	Population information Network	Global and regional demographic statistics	http://www.un.org/popin/data.html
UN Statistics Division	Statistical Databases	Demographic, social, economic, energy and environmental statistics.	http://unstats.un.org/unsd/databases.htm

Organisation	Name of database /information system	Focus of database/information system	Website address
UN Environment Programme	United Nations System-wide Earthwatch	Listing of international and UN databases relevant to environmental decision-making.	http://earthwatch.unep.net/data/index.php
	GEO Data Portal	The online database holds more than 450 different variables, as national, subregional, regional and global statistics or as geospatial data sets (maps). Themes include freshwater, population, forests,emissions, climate, disasters, health and GDP.	http://geodata.grid.unep.ch
	UNEP/GRID - Arendal library of graphic resources	Graphic products that have been prepared for publications and websites over the last 15 years in various themes related to environment and sustainable development. As of 24 Aug 2006 there were 787 graphics available.	http://maps.grida.no
	State of Environment (SoE) Gateway	Links to state of the environment reports from countries and regions	http://www.grida.no/soe/index.htm
	World Conservation Monitoring Centre	Datasets: - World Database on Protected Areas; - Species Database; -Global Coral Diseases; - Publications Database; - Global Marine Aquarium Database; - Marine Mammals Database World Atlas publications: - Biodiversity - Seagrasses - Coral reefs - Mangrove	http://www.unep-wcmc.org
	Global Environment Monitoring System (GEMS) Water Programme	Online access to surface and Groundwater quality data and statistics.	http://www.gemstat.org/queryrgn.aspx

Organisation	Name of database /information system	Focus of database/information system	Website address
Food and Agriculture Organization	FAO Statistical Database (FAOSTAT)	Includes statistics on agriculture, fisheries, forestry, land use and population.	http://faostat.fao.org/?alias=faostat
	Fisheries Global Information System (FIGIS)	Fisheries statistics, maps, factsheets, and publications.	http://www.fao.org/figis/servlet/static?dom=root&xml=index.xml
	FAO GeoNetwork	Geo-spatial data and information.	http://www.fao.org/geonetwork/srv/en/main.home
	AQUASTAT (FAO, Land and Water Development Division)	Provides information on water and agriculture related to: - Land use and population; - Climate and water resources; - Water use, by sector and by source; - Irrigation and drainage development; - Environment and health.	http://www.fao.org/waicent/FaoInfo/Agricult/AGL/AGLW/aquastat/dbase/index.stm
	World River Sediment Yields Database (FAO, Land and Water Development Division)	Contains data on annual sediment yields in worldwide rivers and reservoirs, searchable by river, country and continent.	http://www.fao.org/ag/agl/aglw/sediment/default.asp
	Global Soil and Terrain Database (WORLD-	Provides soil and terrain information on a global scale.	http://www.fao.org/ag/AGL/agll/soter.htm
	Access to Global Online Research in Agriculture (AGORA)	Provides free access to public institutions in developing countries to scientific journals including agriculture, biological, environmental and social sciences.	http://www.aginternetwork.org/en/about.php
UNESCO	Ocean Portal (IODE site - IOC's International Oceanographic Data	Directory of ocean data and information-related websites.	http://www.oceanportal.org
	International Hydrological Programme	Information on current IHP activities in Asia	http://typo38.unesco.org/en/worldwide/ihp-asia-and-pacific.html
	Asian Pacific FRIEND (Flow Regimes from International Experimental Network and Data Sets)	River runoff data and other hydrological and water resources related information (limited data evident as of 25 Aug 06)	http://htc.water.gov.my/apfriend/wa/
International Hydrographic Organisation (IHO)	General Bathymetric Chart of the Oceans	Provides publicly-available bathymetry data sets for the world's oceans. Available for download: 1-minute Global Bathymetric Grid	http://www.ngdc.noaa.gov/mgg/gebco/

Organisation	Name of database /information system	Focus of database/information system	Website address
World Resources Institute (WRI)	EarthTrends Environmental Information	Maintains online database of environmental, social, and economic trends, including: - searchable databases; - country profiles; - maps; - Watersheds of the World information resource (a collection of river basin data).	http://earthtrends.wri.org
IUCN	Water Resources Atlas	Maps of land cover, population density and biodiversity for 154 basins and sub-basins worldwide	http://www.iucn.org/themes/wani/eatlas/index.html
	Global Invasive Species Database	Global information on invasive alien species	http://www.issg.org/database
	The IUCN Red List of Threatened Species	Provides information on the current status of globally threatened biodiversity, including distribution and conservation status of taxa.	http://www.iucnredlist.org
International Coral Reef Initiative (ICRI)	Information Resources	Library of online resources related to coral reefs including books, ICRI publications, journal articles, proceedings, technical reports.	http://www.icriforum.org/Util/info_resources_disp.cfm
World Fish Center	ReefBase	- Country-level data and information on coral reefs from 131 countries including threats, management, monitoring, legislation, and location. - Coral bleaching data. - Online mapping system. - Publications bibliography and document downloads. - Downloadable datasets including GIS.	http://www.reefbase.org/
	FishBase	A global information system on fishes.	http://www.fishbase.org/home.htm
	Fisheries Resource Information System and Tools (FiRST) or TrawlBase	Data management system to organize, store, retrieve and exchange data from research trawl surveys.	http://www.worldfishcenter.org/trawl/index.asp

Organisation	Name of database /information system	Focus of database/information system	Website address
	One Fish Portal	A collection of references and online documents addressing economic effects of climate change on fisheries, and associated policy, regulatory, and resource management issues.	http://www.onefish.org/servlet/CDSServlet?status=ND0yNzgzMzQmNj1lbiYzMz0qJjM3PWtvcw~~
Consultative Group for International Agriculture Research - Consortium for Spatial Information (CGIAR-CSI)	CGIAR-CSI GeoNetwork	- Develop datasets on population, poverty, climate, soils, crops, livestock, transportation, and biodiversity and other geospatial products. - Currently developing CGIAR-CSI GeoSpatial Metadata Resource Center as party of ICT-KM Project.	http://geonetwork.csi.cgiar.org/geonetwork/srv/en/main.home
	NASA Shuttle Radar Topographic Mission (SRTM) 90m Digital	Processed SRTM 90m Digital Elevation Data (DEM) is now available online with worldwide	http://srtm.csi.cgiar.org/
	GeoLinks Directory	Comprehensive online metadatabase for identifying spatial datasets related to agriculture, natural resources management, and livelihoods.	http://csi.cgiar.org/URLDB/Search.asp
International Water Management Institute (IWMI)	RS/GIS Unit	River basin spatial database including at national, regional and global levels.	http://www.iwmidsp.org/iwmi/info/main.asp
Conservation Commons	Conservation GeoPortal	An online metadatabase that provides a comprehensive listing of GIS data sets and maps relevant to biodiversity conservation.	http://www.conservationmaps.org/index.jsp
NASA	Global Hydrology Resource Center	Provides Earth science data and information from satellite, airborne, and surface-based instruments.	http://ghrc.nsstc.nasa.gov/hydro-cgi-bin/execute?hydro+search
	Global Change Master Directory (GCMD)	The GCMD database is a directory of Earth science data and services, and contains greater than 16,000 descriptions of Earth science data sets and services.	http://gcmd.gsfc.nasa.gov
Global Land Cover Facility	Satellite imagery and products	Focus on providing remotely sensed data and products for studying land cover and cover change.	http://glcf.umiacs.umd.edu/data/
US Global Change Research Programme (USGCRP)	Global Change Data and Information System (GCDIS)	Online searchable metadatabase to identify global change data and Information.	http://globalchange.gov
Global Environment Facility	GEF projects database	Online searchable database of GEF projects	http://www.gefonline.org/home.cfm

Organisation	Name of database /information system	Focus of database/information system	Website address
Pacific Institute	Worldwater.org	Information on global freshwater resources	http://www.worldwater.org/
Institute for Science Networking, Carl von Ossietzky University of Oldenburg, Germany	MareNet (worldwide network of Marine Research Institutions and Documents)	- Online search engine for searching across webservers of Marine Research Institutions Worldwide. - Links to databases and data centres. - Links to projects, programs, and initiative. - Links to marine and earth science journals.	http://www.marenet.de/MareNet/marenet.html
International Steering Committee for Global Mapping (ISCGM)	Global Map	Global Map data are produced mainly by National Mapping Organisations participating in Global Mapping project. Data includes eight layers: boundaries; drainage; transportation; population centers; elevation; land cover; land use; and vegetation.	http://www.iscgm.org/cgi-bin/fswiki/wiki.cgi
Center for International Earth Science Information Network (CIESIN), Columbia University	World Data Center for Human Interactions in the Environment	Online metadata search service. CIESIN focuses on population and administrative boundary data. Some datasets are also hosted by CIESIN.	http://www.gateway.ciesin.org/wdc/#Virtual
Federal Institute of Hydrology (BfG), Germany	Global Runoff Data Centre (GRDC)	Digital worldwide repository of river discharge data and metadata.	http://grdc.bafg.de/servlet/is/987/
Oak Ridge National Laboratory	LandScan Dataset	Global population dataset used to estimate populations at risk (< 1km resolution).	http://www.ornl.gov/sci/landscan/index.html
World-wide Hydrogeological Mapping and Assessment Programme (WHYMAP)	WHYMAP Products	- Groundwater mapping resources at global (and finer) scale. - Web mapping application (displaying data including groundwater, surface water, geography and climate).	http://www.bgr.bund.de/cln_029/nn_670840/EN/Themen/Wasser/Projekte/Berat__Info/whymap/whymap__projektbeschr.html#doc519828bodyText7 http://www.bgr.de/app/whymap/
University of Rhode Island	Large Marine Ecosystems (LME) of the World	GIS data including LME boundaries, elevation/bathymetry, country borders, and global coastline.	http://www.edc.uri.edu/lme/gisdata.htm

Organisation	Name of database /information system	Focus of database/information system	Website address
United States National Imagery and Mapping Agency	Digital Chart of the World (DCW): (i) Vector Map Level 0 (Vmap0) version; (ii) ARC/INFO version	(i) Vmap0 is an updated and improved version of the National Imagery and Mapping Agency's (NIMA) Digital Chart of the World (DCW®) A global 1:1,000,000 scale digital map containing: - coastlines - international boundaries - populated places - elevation contours - hydrography - vegetation - transportation (ii) An ARC/INFO version of the DCW is available for download from Penn State University.	http://www.mapability.com/index1.html?http&&&www.mapability.com/info/vmap0_intro.html http://www.maproom.psu.edu/dcw/
National Geophysical Data Center (NGDC), NOAA Satellite and Information Service	NGDC Coastline Extractor	Users can specify geographic coordinates and download GIS coastline data (including from World Vector Shoreline dataset)	http://www.ngdc.noaa.gov/mgg/shorelines/shorelines.html
National Geospatial-Intelligence Agency (NGA) Office of Global Navigation	Prototype Global Shoreline Data	GIS coastline data with greater accuracy than World Vector Shoreline.	http://www.nga.mil/portal/site/nga01/index.jsp?epi-content=GENERIC&itemID=9328fbd8dcc4a010VgnVCMServer3c02010aRCRD&beanID=1629630080&viewID=Article

Regional Coverage:

Organisation	Name of database /information system	Focus of database/information system	Website address
Association of Southeast Asian Nations (ASEAN)	ASEAN Regional Center for Biodiversity Conservation (ARCBC)	- Biodiversity Information Sharing Service (BISS) - Landsat 7 Imagery Browser - Marine Protected Areas in Southeast Asia - Wetlands of Southeast Asia - Links to additional biodiversity databases - World Roster of ASEAN Biodiversity Specialists - Organisations Database - Training Resources Database	http://www.arcbc.org/database_BISS.htm http://www.arcbc.org/biss/landsatidx/ http://www.arcbc.org/arcbcweb/publications/mpa.htm http://www.arcbc.org/wetlands/default.html http://www.arcbc.org/biodiversitylinks/link_02.htm http://www.arcbc.org/arcbcweb/interactive/specialists/default.htm http://www.arcbc.org/arcbcweb/interactive/organization/default.htm http://www.arcbc.org/arcbcweb/interactive/trd/default.htm
UNEP Regional Resource Centre for Asia and Pacific (RRC.AP)	Dataset Catalogue	- Directory of datasets (including GIS) from regional institutions.	http://www.rrcap.unep.org/datacat/
UNEP/GEF Project: Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand	South China Sea Meta-Database	1. Meta-Database including information on datasets available through project partners including: - Coral reefs - Mangroves - Wetlands - Seagrasses - Land based pollution 2. GIS database	http://metadata.unepscs.org/ http://www.unepscs.org
PEMSEA Project: Partnerships in Environmental Management for the Seas of East Asia	Integrated Information Management System (IIMS)	Data sets to be covered: - socioeconomic - demographic - institutional - pollution sources - water quality - biophysical - physiographic	http://www.pemsea.org/abtpemsea/components/iims.htm (IIMS not currently available online)

Mekong River Commission (MRC)	Spatial and time series data	- Metadata available online. - Data sets can be requested from MRC. - Data themes include: administration, climate, culture, environment, fisheries, forestry, hydrology and meteorology, inundation, irrigation, planning, population and human settlements, soils, topography, transportation, water quality, water resources.	http://www.mrcmekong.org/spatial/spatialdata.htm
IOSEA Marine Turtle Memorandum of Understanding	Projects Database	Information on marine turtle conservation projects in Indian Ocean and Southeast Asia	http://www.ioseaturtles.org/projectdb.php
UN Economic and Social Commission for Asia and the Pacific (UNESCAP)	Statistics Division	Socioeconomic data from countries in Asia Pacific region.	http://www.unescap.org/stat/data/apif/index.asp
U.S. Geological Survey Earth Resources Observation & Science (EROS)	Asian HYDRO1k data	Datasets that can be used in hydrologic analysis (including data on drainage basins, elevation, slope, streams, flow direction)	http://edc.usgs.gov/products/elevation/gtopo30/hydro/asia.html

National coverage:

Organisation	Name of database /information system	Focus of database/information system	Website address
Australian Government Department of Environment and Heritage (DEH)	Coasts and Oceans Information Centre	General information Publications National Databases: - Coastal Atlas - Environment Resources Database - National Shipwreck Database - Natural Resources Database - Wetlands Database - DEH Library Catalogue - DEH Online Image Database - EPBC Protected Matters Search Tool - Gazetteer of Australia - Whale and dolphin sightings and strandings database - Water quality targets online	http://www.deh.gov.au/coasts/information/index.html
Southeast Asia Center for Ocean Research and Monitoring (SEACORM)	SEACORM	SEACORM is supported by 16 national research institutions. National metadata available on: - Physical Oceanography - Chemical Oceanography - Biological Oceanography - Climatology - Geography - Remote Sensing	http://www.seacorm.dkp.go.id
WWF Australia	National Marine Debris Database	National Marine Debris Database contains: - Results of marine debris surveys around Australia; - Reports of derelict nets found at sea; - Records of wildlife entanglement	Information about database at - http://wwf.org.au/ourwork/oceans/debris/ (Database not currently available online)
National Geomatics Center of China	National Fundamental Geographic Information System of China (NFGIS)	1:4M-scale topographic database of China, including administrative centers and boundaries, main rivers and lakes, and transportation.	http://nfgis.nsdi.gov.cn/nfgis/english/default.htm
World Data Center for Renewable Resources and Environment, Beijing		Provides data from China on natural resources, environment, population, geography and socioeconomics (data not freely available?)	http://eng.wdc.cn:8086/Metadata/index.jsp
University of Washington, Seattle	China in Time and Space (CITAS)	CITAS data includes: - Vectorized base maps of China, - Georeferenced socioeconomic data - Bibliographic resources	http://citas.csde.washington.edu/data/data.html
Socio-Economic Data and Applications Center (SEDAC), Center for International Earth Science Information Network (CIESIN)	China Dimensions	Data (including GIS) on: - Administrative regions - Population and Public Health - Economics - Public Policies	http://sedac.ciesin.columbia.edu/china

Natural History Museum, London (Darwin Initiative project)	Taxonomic information across the internet	Taxonomic information on polychaetes in Thailand	http://www.nhm.ac.uk/research-curation/projects/taxinfo/
National Mapping and Resource Information Authority (Philippines)	Data Centre (under development)	Data on land use, forestry, agriculture, water resources, coastal zone and other natural resources and environmental information of Philippines.	http://www.namria.gov.ph/
Japan Oceanographic Data Center (JODC)	*Digital Data Holdings at JODC*	Provide global coverage of oceanophysical, hydrophysical properties such as temperature, salinity, ocean current, tide, tidal current, and bathymetry.	http://www.jodc.go.jp/aboutJODC_work_data.html
Korea Oceanographic Data Centre (KODC)	KODC Oceanographic Data Service	Provide oceanographic data from Korean waters.	http://www.nfrda.re.kr/kodc/data/data_e.html
National Coordinating Agency for Surveys and Mapping (BAKOSURTANAL), Indonesia	BAKOSURTANAL website	Provide spatial data for natural resources management.	http://202.155.86.44/