Both ENDS
Information Pack
Nr.6

Coastal Zones Management

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Contents:

- a general overview of the theme
- details of relevant international treaties, guidelines and conventions
- some aspects of the current (international) debates on the topic
- case studies (mainly from Southern countries)
- a listing of useful contacts in North and South
- a list of publications
- a choice of websites

We are making an effort to **regularly update** the information included in these packs. But since people and developments are moving fast, we will inevitably lag behind somewhat. The information presented is meant as an introduction. If you require more specific information, please feel free **to contact us**.

You can **download** the information packs from our website or you can request an e-mail printed version. They are free of charge for NGOs in the South and the CEE countries

We welcome any suggestions or comments which help improve this information pack.

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13. River Management
14. Gene-technology

Coastal Zones Management

Introduction

Up until the 1970s, coastal zones received little or no attention from policy makers, either in the developing or the developed world. However, since then the populations in coastal zones have grown rapidly and currently around 60% of the world population lives in coastal zones. These rapid growth rates have given rise to a number of management problems and local, national and international conflicts. Indigenous populations have been severely disturbed in their traditional way of life, international problems have arisen over the legal property rights to many natural resources within coastal zones and (due to the increasing possibility of sea level rise) the security of a great number of people is being threatened. Almost all of these problems affect coastal zones in both developed and developing countries.

In terms of biodiversity of natural resources, coastal zones are among the richest areas. Coastal zones are also the most vulnerable to threats to the environmental equilibrium. In a number of cases the ecological quality is still very high, but severely threatened by socio-economic and demographic developments taking place both in the coastal zones and in the areas upstream. Despite the rapid demographic and socio-economic developments in coastal zones all over the world, institutional changes have not kept pace. The majority of countries with coastal areas do not have an official governmental or civil organisation specialised in the management and control over these areas. Until today, these responsibilities have mostly been divided between Ministries of Natural Resources, of Fisheries and of Planning and Social Development.

In this information package several of the most pressing problems in the developing countries will be briefly discussed in order to get a general impression of the issues at stake. Case studies will be used to illustrate the problems. A short description will be given on a number of organisations in both the developed and the developing world, which specialise in different aspects of coastal zone management. These organisations are available to provide additional information and support. Also a list of Internet addresses has been included as a start for extensive search on the Worldwide Web.

Main issues in today's Coastal Zones

Urban development

Due to migratory movement and natural population growth, an increasing percentage of the world population now lives in coastal areas. This increasing concentration of the population, in combination with a minimum level of planning and management policies, has lead to a variety of problems:

- building development, solid waste disposal and economic activities have destroyed significant areas of coastal ecosystems.
- pollution of surface and groundwater in coastal areas is critical in all areas adjacent to major urban settlements.

the number of conflicts over the ownership of environmental resources is growing steadily.

Case 1: Indonesia

In Indonesia along the mangrove-coast of South Sulawesi, village communities have lived in harmony with their environment for hundreds of years but now, population growth has caused large-scale losses of the natural mangroves. This has reduced the capacity of the mangroves to protect the land from wind and wave energy, resulting in abrasion and erosion. It also destroyed hundreds of hectares of fishpond. This was the situation in the regency of Sinujai until early 1985. These environmental problems persuaded the farmer group Aku Cinta Indonesi to establish itself as a local NGO in the village of Tongke-Tongke. The objective of the NGO was to rehabilitate

mangroves in coastal areas of East Sinujai. In the first stage, ACI successfully rehabilitated 15 ha and in 1993, the total area of rehabilitated forest amounted to 514.81 ha. The neighbouring villages soon took up this practice. Through this programme, the community has become aware of the benefits of mangrove. They realise how it prevents their village from tidal flooding and blocks waves and coastline abrasion. Economically there is an increase in the fishery production. Aesthetically it creates a pleasant scenery and geomorphically, it balances the microclimate.

Source: Asian Wetland News: Vol. 7 no 2, December 1994

Apart from the increasing pressure on coastal zones, there is an additional problem related to the population growth in these particular areas. One of the expected effects of climatic change is a significant change in the levels of the seas. Given the increased human presence in low-lying coastal areas, a serious problem of security is evident. Major construction works are one way to mitigate its possible effects, but these acquire massive investments and also a change in the policy of governments to take these future expectations seriously.

Tourism

Tourism is an important economic activity in coastal zones all over the world, particularly in developing countries; this sector is of economic importance. The major attractions for tourists going to the tropical coastal zones are the abundance of white beaches, coral reefs and luxurious hotels.
Although tourism brings a certain amount of economic development to these areas, the negative impacts of tourism should not be neglected. For instance, the presence of a great number of tourists threatens the coastal ecosystems, such as coral reefs.
Another aspect is that the economic benefits usually accrue to foreign property developers of tourist organisations. Apart from the employees' income, the majority of the economic benefits don't stay in the region or in the host country, but goes to international businesses and is not reinvested in the area.
Lately eco-tourism is becoming more important and attractive especially for developing countries. By keeping the tourism small-scale and in the hands of local entrepreneurs, the environment is less under threat and the income stays within the region.

Case 2: Casamance Senegal

In the Casamance, a beautiful part of Senegal, the tourists have been coming for a long time. Communities have built small hotels, in which the tourists can stay. At the hotel the guests are offered traditional dances, guided tours by bike or tours to bird islands by pirogue. The income accrued from the hotels, is reinvested in the village. The guides earn a nice salary next to their other income from fishing or farming.

Tourism is subject to rapid changes. International trends in the demand for tourism localities fluctuate heavily. Negative publicity for example can seriously jeopardise tourist initiatives. An example is seen in Egypt where due to attacks on tourists by Muslim fundamentalists, in 1996 and 1997, tourist numbers have fallen significantly.

Fisheries

Besides tourism, fisheries are the major income generating activity in coastal areas. Currently a number of problems exist. Constant overfishing creates a major threat, with stocks decreasing, especially of the most commercially interesting species. Overfishing is caused by local as well as national and international fishermen and industrialised fleets. The UNCLOS (United Nations Conference on the Law of the Sea) in 1995 has tried to form a FAO code of conduct on responsible fisheries.
Fish stocks are directly threatened by the (partial) destruction of their habitats. Important breeding and nursery areas, such as mangroves and coral reefs, are being degraded or even totally disappearing due to pollution, the effects of upstream erosion and the change in land uses due to population pressures from urban growth centres.
Another problem, in both the developed and developing world, is the distribution of fishing rights and the control on quotas and volumes of fish caught. In many developing areas, the concessions

(temporarily property rights) are sold to major foreign or national enterprises. Their industrialised fleets form a direct threat to the livelihood of coastal populations, which depend on small-scale fishery for a significant part of their basic food supply. Currently, international treaties are being implemented to little avail, with stocks continuing to decrease and the distribution of the economic benefits continuing to be imbalanced as ever.

Natural resources: Wetlands, mangroves and coral reefs

Mangroves and coral reefs are two of the most outstanding coastal ecosystems. Mangroves are among the most diverse systems in the world, being an important breeding place for fish and crustaceans. Healthy coral reefs teem with life. Twenty five percent of all marine species live among corals, making them the world's most biologically diverse marine ecosystem. Turtles and seabirds feed on the wide variety of animals and plants, such as fish, crabs, worms, sponges, and molluscs.
Apart from their biodiversity they have many more important functions. Both systems form a basic element in the development chain of fish and crustaceans. Mangroves and coral reefs protect the coastal area against inundation and erosion of beaches, forming a buffer, protecting population areas from the forces of the coastal zone. Furthermore mangroves stand out for their value as a human resource: mangrove forests render high quality wood, which is used by the local populations as firewood and building poles. The areas are very rich in fish, and thus provide an important part in the daily subsistence needs of the indigenous populations. Mangroves can provide income generating activities for local communities of farmers, for instance by the cultivation of oysters.
Although the benefits of both systems are various and very significant, they are both seriously threatened. Upstream erosion, induced by deforestation, agricultural development and the intervention in riverine ecosystems causes major pollution of the aquatic environment. Pesticides threaten the wetland biodiversity, whilst sand deposition blocks the growth and survival of the coral reefs. Woodcutting for domestic and industrial uses is rapidly destroying valuable mangrove areas. Modern forms of aquaculture form a direct threat to the mangroves, especially the intensive shrimp farming which has been implemented all over the world since the 80's. These intensive shrimp farms, not only have a serious impact on the coastal environment, but also affect local communities. Intensive aquaculture does not follow sustainable values, unlike the traditional form of small-scale aquaculture, which uses low inputs and relies on natural tidal action for water-exchange. Chemical, antibiotics and processed feeds are not used. The modern method is larger in scale, requires more capital, excludes local communities and causes severe pollution.

Case 3: Malaysia - Ecuador - Bangladesh

In Malaysia, fishing communities have suffered big declines in fish catch due to clearing of mangroves and river pollution caused by aquatic ponds being set up along the coast.
In Ecuador protests are being heard, because the shrimp production has destroyed most of the mangrove forest in some of the country's coastal regions.
In Bangladesh, thousands of farmers have suffered from the invasion of their rice-lands by aquatic owners and from destruction or damage to their rice crops by seepage of saltwater from the shrimp ponds.

Source: Third World Network 1995

Uncontrolled tourism development affects the quality of reefs all over the world. In some areas, fish are being caught in the reefs by explosives or by using small amounts of cyanide. The first system destroys the reef directly, the second indirectly by killing all small organisms that live in and around the coral reefs.

Climate change and sea level rise

Climate change is expected to cause a significant rise in the level of the seas, with numerous consequences. In the first place, this possible sea level rise threatens small island states, which in some cases might even disappear entirely. In the second place, centres of

population concentration are threatened by an increase chance of inundation. Thirdly, capital such as construction works, office and apartment buildings, hotels etc. will run a higher risk of being affected. Significant damage might also be inflicted on agricultural areas, thereby creating an additional risk to human well-being, given that significant parts of the world's food supply come from the threatened areas.
The prognosis is not encouraging. However, little action has been undertaken. There is a particular lack of investment capital; only a few developed countries have been active in the construction of coastal protection works. Another reason is possibly the high uncertainty surrounding all the predictions related to climate change and its effects.
In 1992 an international workshop by the Intergovernmental Panel on Climate Change, the (IPCC) Coastal Zone Management Subgroup took place. The objective of the workshop was to describe and analyse ongoing activities for assessing vulnerability to sea level rise and formulating potential adaptive response strategies.
The case studies they used were based on a common methodology:

1. to identify and assess physical, ecological and socio-economic vulnerabilities to accelerated sea level rise and other coastal impacts of global climate change; to understand how development and other socio-economic factors affect vulnerability
2. to clarify how response can mitigate vulnerability
3. to evaluate a country's capacity for implementing a response within a broad coastal zone management framework.

Case 4: Mexico - Rio Lagartos, Yucatan

Separated from the sea by a sandy barrier, this special biosphere reserve contains four settlements of about 4,600 people and hosts the only nesting place of the Caribbean flamingo. The main economic activities in the reserve are fishing, salt mining, agriculture and tourism.
A one meter rise in sea level could claim 6.6 km² of the reserve's sandy barrier, thus weakening its protective capacity. It would also disrupt the reserve's highly diversified natural habitats through salt-water intrusion. Guarding against these effects would require an investment of $5 million for new sea walls to protect the barrier island and an additional $0.5 million to reinforce the existing 3 km of walls. Other proposed protective measures include stabilising the sand dunes and reinforcing the existing walls enclosing the salt ponds.

Source: Global Climate Change and the Rising Challenge of the Sea, page 9

Case 5: Venezuela

A one meter rise in sea level could result in the loss of 6,000 km² of land along the Venezuelan coastline. The most serious effect by far would be the possible inundation of Venezuela's sedimentary low-lying coastal plains and deltas, including the Orinoco delta. Increasing erosion could also be very costly to Venezuela's oil infrastructure along the coast, demanding adaptation to the high water level. Several urban areas, which are particularly vulnerable because of the absence of setbacks, face the same problems. Sensitive ecosystems related to the fishing industry, such as mangroves and coral reefs, could be seriously degraded. Nourishing recreational beaches and constructing sea walls along the 200 km of developed coastal areas could cost $1.5 billion for a total protected area of 200 km of coastline. Assuming that this investment would occur over 50 years (2050 to 2100), this represents an annual expenditure of 0.1 to 0.2% of Venezuela's gross national investment in 1987.

Source: Global Climate Change and the Rising Challenge of the Sea (1992)

Problems from the institutional side

As mentioned in the introduction, socio-economic and demographic developments in coastal zones and related upstream areas have only recently been recognised as a main issue in the socio-economic development and management of the coastal resources. Although the panorama of very diverse problems is rapidly increasing, in most cases the preservation of the main values and key characteristics is still possible. Unfortunately, there is very little institutional drive to recognise the coastal

zones as specific regions, which require specific attention from governmental and civil organisations. The activities undertaken are often not co-ordinated and not linked with the different sectors concerned. For instance, as the forestry department is trying to conserve the mangroves, the fisheries departments is setting up new fishponds, which require clearing of the area.
This lack of specific attention has led to a number of problems and conflicts regarding the jurisdiction governing coastal zones and is making it increasingly difficult to manage these sensitive areas according to both their social and environmental needs.

Diversity of stakeholders

Whilst coastal zones in general are characterised by a great biological diversity, stakeholder groups are also very diversified. Wide ranges of different economic and social groups use the coastal zone as the basis for economic development and social well-being. Industrialists use the coastal waters as discharge channels and the wetlands as an energy source. Urban dwellers depend for their daily food intake on fisheries and on wood for their energy supply. Local populations not only depend on the richness the different coastal ecosystems have to offer for their domestic well-being, but also may have a spiritual and traditional dependence on these systems. Foreigners also seem to have a stake in the management of these areas. Foreign entrepreneurs, who are active in the tourist sector, want the freedom to develop their industry to the full. The world community, which is trying to maintain biodiversity in (among others) coastal areas, is striving for strict regulations for the conservation of these areas. Lastly, multi-national companies which depend heavily on coastal resources such as oil and fisheries, wish to continue to do this in the most profitable way.
Each group has its own specific wishes for the coastal area that, as can be seen above, are more often than not conflicting.

Upstream developments

In general, coastal zones are characterised by deltas and smaller lower river basins. The presence of these riverine systems is essential to the environmental quality of the coastal zones, and often plays a key role in the economic development of these areas (i.e. providing irrigation water for the agricultural sector, functioning as transport axis).
Simultaneously they pose a threat to the coastal zone quality. Most of the economic and building activities undertaken in the upper regions of the river basin have an effect on the water quality and quantity of the rivers, and thus on the quality of the environment downstream. The range of the negative effects varies greatly, including:

- drying out of riverbeds and therefore of coastal wetlands due to the construction of upstream dams.
- the deforestation and subsequent erosion of upstream areas, causing great harm to both the mangroves or wetlands and the coral reefs.
- the discharge of chemical and organic substances produced by households, factories and agricultural developments, causing significant damage to groundwater and surface waters.

Lack of differentiated institutions

Despite the recent recognition of the problems related to the coastal zones all over the world, there are very few institutions responsible solely for the management and regulation of these areas in particular.
Consequently, the usual efforts undertaken to improve the socio-economic and ecological situation in these areas are uncoordinated and therefore less effective. Also, the inhabitants, one of the main stakeholders, of the coastal zones lack the power to defend their interests against other groups in society, thus gaining less -budgetary- attention and not being able to defend the coastal area against negative influences from other national and international activities.

This situation is best illustrated by the fact that the majority of coastal nations do not yet have a legal definition of the coastal zones. This fact in itself makes it practically impossible to create specialised institutions and develop a set of policies and related instruments to manage coastal zones appropriately.

Case 6: Vanuatu

A community in the Maskelynes Islands of Malakula was contacted by an overseas buyer of mangrove timber and was preparing to log an area. The Department of Forestry, DOF, is trying to control these plans despite a lack of official policy to protect mangroves. This fact has prompted them to look at a revision of the Forestry Policy and they have asked FAO for assistance to review the Forestry Act.

Source: Mangrove Action Project, Quarterly News, vol. 5 no 1, 1997

Lack of knowledge, data and information

One of the consequences of the past failure to recognise the coastal zone as a particular system has been that the results of past research and data collection have been scattered over a number of different institutions. Likewise, the experiences gained with coastal projects of different kinds have not been shared amongst stakeholders.

Conclusion

The conclusion of the above information is that Coastal Zones are interesting, highly dynamic areas in which the value to human beings have only recently been discovered and acknowledged on a massive scale. It is imperative that specific institutional and public management activities are set in motion, in order to assure that damage is minimised and these areas develop within their socio-economic and ecological limits.

What to do, where to begin?

International agreements

In 1971 the RAMSAR Convention on Wetlands was developed. As the term wetlands includes far more than the coastal zones, the decisions made during this convention have a large impact on the possibilities for the conservation of coastal zones. The RAMSAR convention calls upon the participating countries to make an effort to sustain the wetlands. It provides a framework for international co-operation on wetlands conservation. Under the convention, governments have the tools with which to stem human encroachment on wetlands and protect wetlands both now and in the future.

Two important obligations are: to enhance the wise use, meaning sustainable use, of all wetlands, on national, regional and local levels. The second is more specific and includes a list of selected wetland areas, which are to be protected by their governments. The countries that have signed the convention are to designate at least one area that is to be added to the list of selected wetlands.
Wise use of wetlands asks for a policy which includes the identification of wetlands and the values of these wetlands; the implementation of laws to protect the wetlands; the execution of pilot projects on sustainable use of the wetlands and the production of Environmental Impact Assessments when planning projects with wetlands that are involved. Since the treaty was developed it has been amended several times.

At the Coastal Zone Conference, held in 1993, a number of developments were set in motion. In the first place, policy makers all over the world as areas of particular interest accepted Coastal Zones. The urgency to act has led to a number of specific coastal zone projects, most of which have a long-term set up, and final results have not been obtained. Secondly, the concept of Integrated Coastal Zone Management has gained acceptance. This concept of a general framework for the management of all activities in coastal zones is based on the following premises:

- Stakeholder participation is crucial in all phases of activity planning, design, evaluation and implementation.
- The different ecological and human systems have to be considered simultaneously in any planning process in order to assure that all positive and negative effects are considered in the evaluation of the activities.
- The design of appropriate institutional structures, including legislation, is essential.

Essential websites:
http://www.ramsar.org
http://www.wetlands.org

The UNCLOS (United Nations Conference on the Law of the Sea) is another convention not directly dealing with coastal management. However its agreements on international fisheries and fishing systems offer possibilities to undertake actions to conserve coastal areas, like reefs and mangroves. A short description is already given in the paragraph on fisheries.

Website: http://www.unclos.com

Organisations

Africa

Secretariat For Eastern African Coastal Area Management
The Secretariat springs from the desire of the East African countries to accelerate implementation of integrated coastal zone management in the region as put forth in the Arusha Resolution (1993) and Seychelles Statement (1996) on ICZM. SEACAM's objective: To assist the Eastern African coastal countries to implement and coordinate coastal management activities in the region.

Contact information:
Address: 874, Av. Amílcar Cabral, 1st floor, Caixa Postal 4220, Maputo, Mozambique
Phone: +258-1-300641/2
Fax: +258-1-300638
E-mail: seacam@virconn.com
Website: http://www.seacam.mz

Asia

CCOP Technical Secretariat
The CCOP can be considered as one of the focal points of Intercoastal Zone Management (ICZM) activities in E and SE Asia. They run a programme COASTPLAN "Geoscience for ICZM". CCOP is an intergovernmental organisation.

Contact information:
Address: 24th Floor, Suite 244-5, ThaiCC Tower, 889 Sathorn Tai Road, Sathorn, Bangkok 10120, Thailand
Phone: +66-2-672.3080-1
Fax: +66-2-672.3082
E-mail: ccopts@ccop.or.th
Website: http://www.ccop.or.th

WorldFish Center (previously known as ICLARM - International Center for Living Aquatic Resources Management)
The WorldFish Center is an autonomous, non-governmental, non-profit, international scientific and technical centre which has been organised to conduct, stimulate and accelerate research on all aspects of fisheries and other living aquatic resources. The Centre's work focuses in tropical developing countries in both inland aquatic (mainly ponds and rice floodwaters) and marine (coastal and coral reef) systems - in which research is carried out on their dynamics, on investigating alternative management schemes, and on improving the productivity of key species. The work includes cooperative research with institutions in developing countries, and supporting activities in information and training.

Contact information:
Headquarter: Jalan Batu Maung, Batu Maung, 11960 Bayan Lepas, Penang, Malaysia.
Mail address: P.O. Box 500, GPO 10670 Penang, Malaysia
Phone: +60-4-626.1606

Fax: +60-4-626.5530
E-mail: worldfishcenter@cgiar.org
Website:
http://www.worldfishcenter.org

Wetlands International Asia Pacific
Wetlands International is the result of a merger between the Asian Wetlands Bureau, The International Waterfowl and Wetlands Research Bureau and Wetlands for America. It has an emphasis on mangrove management with a particular focus on the waterfowl. Their mission is to sustain and restore wetlands, their resources and biodiversity for future generation through research, information exchange and conservation activities worldwide.

Contact information:
Address: 3A39, Block A, Kelana Centre Point, Jalan SS7/19, 47301 Petaling Jaya, Selangor, Malaysia
Phone: +60-3-7046.770
Fax: +603-7046.772
E-mail: wiap@wiap.nasionet.net
Website: http://www.wetlands.agro.nl/aboutWI/offices/APstaff.htm

Caribbean

Caribbean Mangrove Network
A newly formed network which aims to promote conservation and sustainable management of Caribbean mangroves by pooling expertise and linking institutions and resource people.

Contact information:
Contact person: Gerard Alleng
Address: Institute of Marine Affairs, Hilltop Lane, Chaguaramas, P.O. Box 3160, Carenage, Trinidad & Tobago
Phone: +1-809-6344291;
Fax: +1-809-6344433
E-mail: galleng@ima.gov.tt

Europe

Tropical Coastal management Consultants (TCMC) (previously known as CCM - Centre for Coastal Management)
The mission of CCM is to promote coastal management through the coupling of fundamental and applied research in coastal systems with advice on practical and policy issues.

Contact information:
Ridley Building, University of Newcastle, Newcastle upon Tyne, NE1 7RU, United Kingdom
Phone: +44-191-2225607;
Fax: +44-191-2225095
E-mail:
Enquiries@SustainableCoasts.com
Website:
http://www.sustainablecoasts.com

CZMC - Coastal Zone Management Centre
The Coastal Zone Management Centre provides a platform for cooperation and transfer of information on the sustainable management of coastal resources. The centre has been set up in response to the call by 1992 UN conference on Environment and Development (UNCED) for the exchange of know-how and technology to enhance implementation of integrated Coastal Zone Management Programmes by coastal nations around the world. The website contains a great number of links.

Contact information:
Kortenaerkade 1, P.O. Box 20907, 2500 EX The Hague, the Netherlands
Phone: +31-70-3114311/3114364;
Fax: +31-70-3114380 / 3114300
E-mail: czmc@rikz.rws.minvenw.nl
Website: http://www.netcoast.nl

IUCN - World Conservation Union - Wetlands and Water Resources Programme
The IUCN Wetlands Programme co-ordinates and reinforces IUCN's activities relating to wetland management. The core of the programme is a series of filed projects which are developing methodologies for wetland management, largely in developing countries.

Contact information:
Rue Mauverney 28, 1196 Gland, Switzerland
Phone: +41-22-9990001;
Fax: +41-22-9990025
E-mail: wetlands-water@iucn.org

Website:
http://iucn.org/themes/wetlands

MADAM
MADAM stands for Mangrove Dynamics and Management and is a German-Brazilian research and development program on tropical coastal ecosystems.

Contact information:
Contact person: Prof. Dr. Ulrich Saint-Paul
Address: c/o ZMT Bremen, Fahrenheitstr. 6, 28359 Bremen, Germany
Phone: +49-421-23800-22
Fax: +49-421-23800-30
E-mail: uspaul@zmt-bremen.de
Website: http://www.zmt.uni-bremen.de/files/main.php?language=en&a=proj&ID=1&deep=2&start=1 and http://www.uni-protokolle.de/nachrichten/id/5779/

Mangrove Management Group
The Mangrove Management Group is an informally organized and open collaboration between various scientists of the Free University Brussels (VUB), intending to combine their diverse expertises as applied to the mangrove ecosystem in its widest sense.

Contact information:
Address: c/o Laboratory of General Botany and Nature Management, Vrije Universiteit Brussel (Free University Brussels), Pleinlaan 2, 1050 Brussels, Belgium
Phone: +32-2-629.34.20
Fax: +32-2-629.34.13
E-mail: mangrove@vub.ac.be
Website:
http://www.vub.ac.be/mangrove/index.html

MEDCOAST
MEDCOAST is a network of government bodies, universities, and UN organizations contributing to coastal and marine conservation in the Mediterranean and Black Sea through improved coastal management practices. This goal is pursued by enhancing scientific and professional collaboration among individuals and institutes.

Contact information:
Address: c/o Middle East Technical University, 06531 Ankara, Turkey
Phone: +90-312-2105429/30/35
Fax: +90-312-2101412
E-mail: medcoast@metu.edu.tr
Website:
http://www.metu.edu.tr/home/wwwmdcst

UNESCO, Coastal regions and Small Islands Program
CSI's goal is to assist Member States towards environmentally sound, socially equitable and culturally appropriate development in coastal regions and in small islands. CSI contributes to the advancement of pertinent knowledge, the integrated application of research findings and capacity building in transdisciplinarity. It serves as a platform for cross-sectoral, cooperative action.

Contact information:
Address: 1 rue Miollis, 75732 Paris Cedex 15, France
Phone: +33-1-45683971
Fax: +33-1-44490014
E-mail: g.wright@unesco.org
Website:
http://www.unesco.org/csi/csiinf.htm

Far East

GLObal Mangrove database and Information System (GLOMIS)
This is a project of the International Society for Mangrove Ecosystems (ISME). GLOMIS is based at Okinawa, Japan and coordinates four Regional Centres located in Brazil, Fiji, Ghana and India.
Major objectives of GLOMIS are: (1) To construct a database with the characteristics of single mangrove species and of mangrove ecosystems; (2) to disseminate worldwide the information stored in the database; (3) to focus on the functioning, management and rational uses of single species of mangroves and of entire mangrove ecosystems (including local environmental and socio-economic implications for coastal communities); (4) to organize, maintain and up-date the information system that is meant for the use of forestry, fisheries, lawmakers

and administrators, decision makers and users at large.

Contact information:
ISME Secretariat
Address: c/o Faculty of Agriculture, University of the Ryukyus, Okinawa 903-0129, Japan
Phone: +81-98-895.6601
Fax:+81-98-895.6602
E-mail: mangrove@ryukyu.ne.jp
Website: http://www.glomis.com

International Society for Mangrove Ecosystems (ISME)
The ISME promotes the study of mangroves in order to encourage their conservation, rational management and sustainable utilisation; ensures that the public remains aware of this ecosystem. It works at regional, national and global level doing studies, publishing technical manuals and carrying out projects in various countries.

Contact information:
Address: c/o College of Agriculture, University of Ryukyus, Okinawa 903-01, Japan
Fax: +81-98-8956602
E-mail: mangrove@ii-okinawa.or.jp
Website:
http://www.mangrove.or.jp/index.html

Latin America

CENAREC - Centro Nacional de Recursos Costeros
Address: Campus Prosperina Km 30.5 vía perimetral, P.O. Box 09-01-5863, Guayaquil, Ecuador
Phone: +593-4-269464/269470/ 269451
Fax: +593-4-854587/269470
E-mail: cenarec@goliat.espol.edu.ec or ecervan@espol.ec

Centro de Ciencias Ambientales EULA
Address: Universidad de Concepción, Casilla 160-C, Chile
Phone: +41-204002/204080/204000
Fax: +41-242546
E-mail: eula@udec.cl
Website: http://www.eula.cl

North America

Coastal Resource Center
All CRC projects place a major emphasis on building constituencies for improved management at both local level and within central government, in order to create management processes that can be implemented and are supported by the societies affected.
It is CRC's preference to build long-term collaborative relationships with its partners in the belief that learning is maximised when efforts to instigate change within society are sustained over the years. CRC is the publisher of the InterCoast Network Newsletter.

Contact information:
Address: University of Rhode Island, Narrangasett Bay Campus, Narrangasett, RI 02882, USA
Phone: +1-401-8746224
Fax: +1-401-7894670
E-mail: communications@crc.uri.edu
Website: http://www.crc.uri.edu

Coral Reef Alliance
The Coral Reef Alliance (CORAL) is a member-supported, non-profit organization, dedicated to keeping coral reefs alive around the world. To enhance the ability of people that live and work near coral reefs to protect their local reefs, CORAL provides 1) Financial assistance to local projects where a small amount of money can have a big impact, 2) Advice, training and materials on how to reduce the impact of over-fishing, excessive coastal construction, the dumping of sewage, chemicals and sediment, and other human activities that kill coral reefs, 3) A network for local groups to communicate with, learn from and teach groups in other areas, and 4) CORAL helps create and strengthen support for coral reef parks and other protected areas where coral reefs can be appreciated in their natural condition. CORAL has launched the coralreef.org partner site, cyber home to ICRIN the International Coral Reef Information Network.

Contact Information:
Address: 417 Montgomery Street, Suite 205, San Francisco, CA 94104, USA
Phone: +1-415-8340900

Fax: +1-415-8340999
E-mail: info@coral.org
Website:
http://www.coralreefalliance.org

MAP- Mangrove Action Project
MAP is dedicated to reversing the degradation of mangrove forest ecosystems worldwide. Its central tenet is to promote the rights of local coastal peoples, including fishers and farmers, in the sustainable management of coastal environs. MAP provides four essential services to grassroots associations and other proponents of mangrove conservation: 1) It coordinates a unique international NGO network and information clearinghouse on mangrove forests; 2) It promotes public awareness of mangrove forest issues; 3) It develops technical and financial support for NGO projects; and 4) MAP helps publicize within the developed nations the basic needs and struggles of Third World coastal fishing and farming communities affected by the consumer demands of the wealthy nations. (This they do through their quarterly newsletter, bi-weekly news bulletins, action alerts, and published articles, as well as planned public forums and presentations.)

Contact information:
Contact person: Alfredo Quarto, director
Address: P.O. Box 1854, Port Angeles, WA 98362-0279, USA
Fax: +1-360-4525866
E-mail: mangroveap@olympus.net
Website:
http://www.earthisland.org/map/index.htm

Pacific

South Pacific Regional Environment Programme
The South Pacific Regional Environment Programme (SPREP) is a regional organisation established by the governments and administrations of the Pacific region to look after its environment. This is reflected in the Mission Statement of SPREP which calls on the organisation, "to promote co-operation in the South Pacific region and to provide assistance in order to protect and improve its environment and to ensure sustainable development for present and future generations".

Contact information:
P.O. Box 240, Vaitele, Apia, Samoa
Phone: +685-21929
Fax: +685-20231
E-mail: sprep@sprep.org.ws
Website: http://www.sprep.org.ws

Suggestions for further reading

IUCN, *Cross-sectoral Integrated Coastal Area Planning: Guidelines and principles for Coastal Area Development* (Switzerland 1993)

World Bank, *Africa: A framework for integrated coastal zone management* (USA 1994)

Chua Thia-Eng and Daniel Pauly, ed., *Coastal area management in Southeast Asia: Policies, management strategies and case studies* (Malaysia 1989)

ADB, *Towards an effective water policy* (Manila 1996)

ADB, *"Environmental evaluation of coastal zone projects"* ADB Environment Paper no.8 (Manila 1991)

Wind, H.G. ed., *Impact of sea level rise on society* (The Netherlands 1987)

Climate Action Network, *International NGO Directory 1994* (Brussels, Washington 1994)

Clarke, J.R., *Coastal Zone Management Handbook* (Washington 1995)

Kenchington, R.A., *Managing marine environments* (New York 1990)

Sorensen, J.C. and S.T. McCreary, *Institutional arrangements for managing coastal resources and environments* (Rhode Island 1990)

Global Climate Change and the Rising Challenge of the Sea, Intergovernmental Panel on Climate Change Response Strategies Working Group Coastal Zone Management Subgroup, (Netherlands, March 1992)

Bibliographies

Coastal Zone References:
A list of bibliography sources relevant for Coastal Zone Management in the Caribbean provided by the Island Resources Foundation (http://www.irf.org/irczrefs.html)

Coastal Zone Management and Aquaculture bibliography of related references by the Aquaculture Information Center of the DOC/NOAA (http://www.lib.noaa.gov/docaqua/czm.html)

Magazines

Ocean and Coastal Management, Elsevier (http://www.elsevier.nl/inca/publications/store/4/0/5/8/8/9/index.htt)

InterCoast Network, an international newsletter of coastal management by the Coastal Resources Center (http://www.crc.uri.edu/comm/htmlpubs/ic/IC36.html)

GeoCoast is an electronic journal (http://www.geocoast.co.uk) intended to provide a new medium concerning all aspects of geotechnology to Integrated Coastal Zone Management (ICZM) (http://www.geocoast.co.uk)

Useful Websites

The following list of websites is not complete, but will give a good starting point for updated information on coastal zones. Some sites will have lists of documents on the subject, other will have links with organisations involved in coastal management issues and some will give general information on the environment, but can still be of interest for information on coastal zones.
(For more websites search the Internet by Google.com, keyword ICZM)

Coastal Engineering Page
http://www.coastal.udel.edu//coastal.html
The Coastal Engineering Page was last updated in 2000 but is still a useful source for information on coastal engineering.

Coastalmanagement.com
http://www.coastalmanagement.com
A gateway into the world of coastal management.

Coastal Management Web
http://members.iinet.net.au/~kays/coastalmanagement.com
This is an independent venture by Coastweb Consulting. It is dedicated to providing Internet services on coastal management. Formed in 1997 Coastweb consulting is based in Perth Western Australia and stems from the success of the Coastal Zone Management Source pages- a Web-based links resource for coastal managers established in 1996. Affiliations are currently being negotiated with universities, governments and international organisations. It is possible to link your website to theirs.

The Coastal Resources Centre
http://www.ucc.ie/research/crc
The CRC is a multi-disciplinary group within University College, Cork. As an integral part of the overall Environment Research Institute (ERI), the CRC serves as a critical source of expertise dedicated to ocean and coastal research and resource studies.

European Union for Coastal Conservation
http://www.eucc.nl/en/home/index.htm
The EUCC is dedicated to the integrity and natural diversity of the coastal heritage and to ecologically sustainable development. It is the largest coastal network in Europe and the sites contains numerous links to interesting organisations.

FAO - Fisheries Department
http://www.fao.org/fi/default.asp
This website gives more information on international agreements on fishery. Further it consists a search instrument on subjects that can be of interest.

ICM Global Web Service
http://icm.noaa.gov/welcome.html

This global web service on integrated coastal management (ICM) is a cooperative undertaking among the Intergovernmental Oceanographic Commission, UNESCO, the National Ocean Service, National Oceanic and Atmospheric Administration, the Center for the Study of Marine Policy (University of Delaware), and the World Bank, in conjunction with a number of other partners around the world.

Intergovernmental Panel on Climate Change
http://www.ipcc.ch
The IPCC was established in 1988 by the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) to assess the available scientific, technical, and socio-economic information in the field of climate change. Information can be found on several aspects of climate change.

International Coral Reef Information Network
http://www.coralreef.org
ICRIN is the communications and information project of the International Coral Reef Action Network (ICRAN). ICRIN serves to provide: 1) General coral reef information, 2) Tools and resources, and 3) A central coral reef communications and network hub.

International Oceans Institute of Canada
http://www.ioic.dal.ca
The IOIC is a nongovernmental organization dedicated to promoting and supporting the sustainable and rational use, management, and regulation of ocean and coastal resources, as well as the protection and conservation of the marine environment in Canada and internationally.

Island Resources Foundation
http://www.irf.org
The IRF is a private, non-profit research and education organisation based at Red Hook in St. Thomas, US Virgin Islands, dedicated to solving the environmental problems of development in small tropical islands, with a Caribbean focus.
Their activities are: 1) Development of management models for long-term sustainable development in coastal areas of small tropical islands; 2) Biodiversity conservation, especially in the Eastern Caribbean, including several projects involving government agencies and NGOs in joint planning activities; 3) Information services in support of environmental planning and management, including GIS, desktop mapping and access to Internet resources.

Land Ocean Interactions in the Coastal Zone
http://www.nioz.nl/loicz
LOICZ is a scientific research project studying the influence of changing climatic factors and the impact of human activities on material fluxes from drainage basin to the continental shelf edge. The project attempts to generate global syntheses of information in disciplines including both the natural and socio-economic sciences. The Land-Ocean Interactions in the Coastal Zone Project is one of eleven Programme Elements of the International Geosphere-Biosphere Programme (IGBP). One of the goals of this project is to provide a sound scientific basis for future integrated management of coastal areas on a sustainable basis.

NetCoast
http://www.netcoast.nl
NetCoast is a site designed for the Third World and intended for everyone involved in Coastal Zone Management. It is produced by the Dutch Coastal Zone Management Centre (see above). The objectives of NetCoast are to provide free access to information of current relevance; to refer users to free-access information provided by third parties (in other words, to information not kept in this facility but available from the servers of the companies or institutions involved); and to facilitate interactive communication.

Office of Ocean and Coastal Resource Management
http://www.ocrm.nos.noaa.gov/welcome.html
This Website provides information for coastal resource managers, planners, educators, scientists, and others interested in balancing the conservation and development of coastal, estuarine and ocean resources in the United States.

Ramsar Convention on Wetlands
http://www.ramsar.org
It is a very extensive site with a.o. the Ramsar List of Wetlands of International Importance (in partnership with Wetlands International), a Partnership section, information on items like World Wetlands Day, the Ramsar Wetlands Award, Library, Photo Gallery and Links. The site is in English, French and Spanish. The site has several powerful search functions.

ReefBase: The Global Information System on Coral Reefs
http://www.reefbase.org
ReefBase is an online information system on coral reefs, and was designed to provide relevant data and information to reef managers and scientists, as well as the general public.

Strategic Initiative for Ocean and Coastal Management
http://www.sdnp.undp.org/siocam
This site is a virtual framework for SIOCAM (a Global Project of UNDP) to achieve its objective of enhancing the capabilities of existing and future ocean and coastal management projects through the systematic identification, documentation and sharing of best practices and lessons learned.

Tropical Coast Management Studies
http://www.ncl.ac.uk/tcmweb/ctcms
The TCMS was established in 1987 to provide a focus for postgraduate teaching and research in tropical coastal management. The prime research thrust has been the science underpinning coastal management. The long-term aim is to develop local expertise and promote international collaboration in the scientific study and management of tropical coasts. See also http://www.envision.uk.com/ for practical solutions.

UNCLOS – United Nations Convention on the Laws of the Sea
http://www.unclos.com
This site is dedicated to the United Nations Convention on the Law of the Sea.
UNEP World Conservation Monitoring Centre
http://www.unep-wcmc.org
The UNEP-WCMC was established in 2000 as the world biodiversity information and assessment centre of the United Nations Environment Programme.

World Commission on Protected Areas
http://iucn.org/themes/wcpa/
The WCPA is the world's leading global network of protected area specialists. The IUCN Programme on Protected Areas (PPA) is the focal point within the IUCN Secretariat for Protected Areas and serves as the Secretariat for WCPA. WCPA's international mission is to promote the establishment and effective management of a worldwide representative network of terrestrial and marine protected areas.