

INFORMATION NEEDS FOR INDONESIA COASTAL AND MARINE ENVIRONMENTAL MANAGEMENT

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Abstract

This paper described some major Issues in conjunction with Marine and Coastal Environmental Management in Indonesia, and consequently outlined the Information Need for Indonesian Marine and Coastal Resources Development.

It is comprised under the headings of :

- Introduction, giving the overall notes of the Marine and Coastal situation in the country;*
- Review on the Implementation of Chapter 17 of Agenda 21 : Protection of the Ocean/Marine Environment;*
- Major Issues and Constraints in the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities;*
- Indonesia's National Strategy on Coastal and Marine Environmental Management;*
- Information Need for Indonesian Marine and Coastal Resources Development.*

It is also an attempt to integrate all the efforts in relationship with the Integrated Coastal Zone Management (ICZM) which is currently introduced and justified worldwide, and likely be conducted properly, since in Indonesia Integrated Marine and Coastal Zone Management will cover activities in Planning, Utilization, Maintenance, Control, Evaluation and Restoration, Rehabilitation, Development and Conservation.

I. INTRODUCTION

Indonesia is an archipelagic country which has 17,508 islands and along coastline around 81.000 km. Approximately 3.1 million of the 5.0 million square kilometers of Indonesia's territory is composed of marine and coastal waters. Indonesia's territorial waters comprise 0.3 million km² territorial sea, and 2.8 million km² Inner seas in addition to 2.7 million km² in the Economic Exclusive Zone which will be under Indonesia's management according to the UN Convention on the Law of the Sea.

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There is no doubt that the Indonesia archipelago has a strategic role in international waters. The need for the protection of marine and coastal areas arises as a result of the heavy pressures from destruction of resources, pollution, and potential given to over exploitation of fish resources. These pressures are the result of the increasing demand for development, and the fast growing population. Indonesia is now entering a historical time as the "Marine Sector" has been included in the second 25 year Indonesia development plan which starts in 1994. This strategy should be supported through the integrated coastal and marine(1) development within the 2nd long term development framework.

Indonesia recognizes its role in coastal zone and marine environmental management at the global context, and therefore at national level special attention has been supporting marine and coastal, conservation and to promote sustainable development its economy, as well as to fulfill the needs of its large coastal population through sustainable use of coastal and marine natural resources.

The over exploitation of marine resources has the implications for the long-term viability of the coastal and marine resources base. Such as over-fishing, destructive fishing methods, habitat destruction, conservation of endangered marine species, land-based and marine pollution.

Integrated Coastal Zone Management (ICZM) is an impact tool for achieving sustainable development in Indonesia. ICZM with Principles 1 through 19 contained in the Rio Declaration, Chapter 17 Agenda 21, on the Protection of the Marine Environment and Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, adopted in Washington Intergovernmental Conference, 1995.

An integrated coastal and marine resources development strategy will focus on maritime concepts of economic development. Concentrating on the sub-sectors of fisheries, marine tourism, land-based and marine pollution control, sea-communications, marine mining and energy, marine industry, and shipping, marine human resources development, marine science and technology, and marine institutions and regulations.

Integrated Marine and Coastal Zone Management will cover efforts in Planning, Utilization efforts, maintenance, control, evaluation and restoration, rehabilitation, development and conservation of the Marine and Coastal Environment.

The goal of marine and coastal zone management is to develop the optimum utilization of marine and coastal resources in an effective and efficient way. The role of marine and coastal zone management is to integrate and sustain efforts in governmental coordination with Community Private Sectors (LSM/NGO) in developing basic principles for strategic, technical, and operational policies.

In this case, Seawatch-Indonesia, as an environmental monitoring, forecasting and information system can provide "real time" data supporting Marine and Coastal Resource Information Management

A number of acts and regulations directly or indirectly concern the management of the environment in Indonesia for many years. Since 1980 emphasis or comprehensive and integrated management natural resources has been identified.

Some of the basic regulations affecting the coastal zone are as follows :

1. Act No. 5 of 1967 on the Basic Provisions of Forestry.
2. Act No. 1 of 1973 on the Continental Shelf of Indonesia.
3. Act No. 5 of 1974 on the Government Devolution of Authority to Regional Governments or Provinces.
4. Act No. 5 of 1983 on EEZ of Indonesia.
5. Act No. 9 of 1990 on Fisheries.
6. Act No. 5 of 1990 on the Conservation of Natural Living Resources and their ecosystems.
7. Act No. 24 of 1992 on the Spatial Planning.
8. Act No. 23 of 1997 on the Management of Living Environment.

II. REVIEW ON THE IMPLEMENTATION OF CHAPTER 17 OF AGENDA 21 : PROTECTION OF THE OCEAN/MARINE ENVIRONMENT

Indonesia actively participated in the two year preparatory process leading up to UNCED and the development of the global Agenda 21 and two important convention i.e. Convention Biodiversity and Climate Change that are related to the marine environment. At the conference itself, the Government of Indonesia accepted a number of undertaking on behalf of Indonesia, and endorsed the following documents :

1. Rio Declaration on Environment and Development. The Rio Declaration is a set of 27 non-binding principles which emphasize the link between environment and development;
2. Statement of Principles on Forestry. Although this is a non-binding document, it recognizes that forests are essential for economic development as well as for carbon dioxide sequestration and for the preservation of biological diversity and watershed management;
3. Convention on Climate Change. This legally binding treaty is aimed at lowering emissions of carbon dioxide, methane, and other greenhouse gases into the atmosphere;
4. Convention on Biological Diversity. This legally binding treaty is aimed at halting the destruction of biological diversity and at introducing standards of conduct in the sharing of research, information, profits, and technology in the area of genetic resources;
5. Global Agenda 21 document. This is a document of over 800 pages which contains comprehensive, non-binding action programs for sustainable development from now into the twenty-first century.
6. Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, adopted in Washington Intergovernmental Conference, 1995.

In the wake of UNCED, the Government of Indonesia was quick to formulate a plan to comply with the principal environmental agreements and the broad objectives of implementing sustainable development. The vehicle chosen for the implementation of many of these objectives was a project funded by the United Nations Development Program (UNDP) and executed by the State Ministry for Environment. The project was known as the Post-UNCED Planning and Capacity Building Activities Project, and its key output was the development of a comprehensive national strategy for sustainable

development.

The Rio Declaration became the basis for focussing the global Agenda 21 on integration of people in relation to their environment and development. This concept is in line with Indonesia's development programs which have been carried out systematically since 1969. In keeping with the intentions of the Indonesian constitution, Indonesian development is centered on efforts to improve the living standards and dignity of the Indonesian people, in harmony with their environment.

The Agenda 21 Indonesia regards poverty alleviation as an important area of sustainable development since poverty not only burdens growth, it also causes environmental degradation. Poor communities will be unable to maintain their environment, much less repair the damage. On the other hand, poverty also occurs because of environmental degradation and isolation from access to common resources. Therefore, the management of natural resources constitutes a critical aspect of the prevention and eradication of poverty.

III. MAJOR ISSUES AND CONSTRAINTS IN THE IMPLEMENTATION OF THE GLOBAL PROGRAMME OF ACTION FOR THE PROTECTION OF THE MARINE ENVIRONMENT FROM LAND-BASED ACTIVITIES.

Major water-related environmental problems in Indonesia consisted of both Land-based sources of pollution and marine sources of pollution. Land-based sources of pollution consisted of : domestic wastes, industrial wastes, agricultural, mining and sediments; whereas marine pollution are : vessel borne, land-based, dumping and mining from activities at sea.

A. Land based sources of pollution

The land based pollution in Indonesia is caused by domestic wastes, agricultural wastes (pesticides and fertilizers), mining wastes and sediments.

1. Domestic Wastes

The high rate of urbanization, occurring mainly near the coast is indirectly a source of domestic waste (sewage, sulluage and solid waste). All wastes are directly thrown into the marine and coastal environment. Traditionally, rivers and canals are also considered "waste baskets". Various forms of waste material are directly thrown away into rivers, canals and ducts that are ultimately transported to estuarine and marine wasters.

At present there is no single sewage treatment system in the Indonesian archipelago. All wastes are literally dumped into the environment. Organic wastes create problems when the capacity of aquatic system to deal with them is exceeded and actuate problems of eutrophication and oxygen depletion can arise (Knox 1979). Sewage pollution also process a problem to human health through the concentration of bacteria and human disease pathogens such as typhoid viruses by filter-feeding bivalves, which are used as food. Although primarily concentrated on the islands of Java, Bali and Madura, it is estimated that approximately 25% of Indonesia's population can be found living in 54 major urban centers. Most of this urbanization is occurring along the coast and the treatment of sewage in these

centers is minimal to non-existent, expect perhaps in some of the newer developments.

Perhaps the most pervasive and immediately visible problem in Indonesian coastal and marine waters is that of litter and plastic. The principle reasons for this situation probably stems from generally inadequate waste disposal programs in major urban centers and the habit of the general public in using waterways as a convenient disposal site. For example, in Jakarta city alone, it is estimated that 860,000 tons of garbage is left uncollected each year (Koe & Aziz, 1994). A significant portion of the uncollected trash makes its way to the coastal waters of Jakarta and is subsequently carried to other landfalls. A short walk around Pulau Laki of the Seribu Island group very dramatically illustrates the extent of the problem. Aside from the aesthetic detraction, litter and plastics also negatively impact on the various biological components of the coastal and marine environments.

2. Industrial Wastes

Industrial wastes as outflows from factories and other industrial activities enter to the marine aquatic environment directly or through rivers, canals, and drains without any treatment.

Indonesia is a newly industrialized country and industrial development has been going on in full force. Industrial wastes as outflows from factories and other industrial activities enter the marine aquatic environment directly or through rivers, canals, and drains without any treatment. Wastes from tapioka (cassava meal) producing industries have threatened the fishery resources in public waters, whereas in Central Java, these industries have destroyed shrimp farms in brackish water ponds. Some chemical in West Java and Central Java have also caused pollution to public water supply sources. Pollution due to industrial wastes in JABOTABEK, (Jakarta, Bogor, Tangerang and Bekasi) area, especially the metal industries, have increased the heavy metal contents of the Jakarta Bay waters. In some locations, the mercury and cadmium contents tend to exceed their upper limits of pollution level. Sugar factories in some locations in Central Java during milling season throw their wastes into public waters, resulting in pollution of river waters, fresh water ponds and brackish water ponds in those areas.

The wide range of natural resources in Indonesia gives it a strong potential manufacturing industry base. Industrial zones have been established in Java, Sumatera, South and East Kalimantan, and in Sulawesi. All major industrial centers are located on or near the coast. The country's two major manufacturing centers and ports are Jakarta and Surabaya, both in Java. Java is the base for 75% of Indonesia's manufacturing activity.

Outside Java, manufacturing is mainly related to exploitation and processing of local resources such as oil and gas, forestry, paper and pulp, and food products. The major centers in Sumatera are on the Strait of Malacca; in East Kalimantan and in South Sulawesi. Industrial activity on the east coast of Kalimantan is mostly linked to the oil industry. The petrochemical is also a major activity on the

north-east coast of Sumatera.

New industrial developments are being discouraged from locating within existing centers of Jakarta and Surabaya. The preference is for locating along the coastline near cities. Although this relieves some future pollution pressures on the rivers in these areas, these pressures will now be transferred to the coastal zone which is, in general, less well understood and monitored.

3. Agricultural Wastes

Agricultural wastes containing pesticides and fertilizers residues of high toxicity levels have been found to pollute some water systems, especially in areas of intensive agriculture in North Sumatera, West Sumatera, West Java, and South Sulawesi.

Persistent Organic Pollutants (POPs)

This source of pollution to the marine and coastal environment is perhaps one of the more insidious as well as one of the most difficult to effectively reduce and eliminate. In an effort to increase agricultural yields from a finite land resource, the use of herbicides and pesticides have been instrumental in increasing harvest yields. In spite of their effectiveness, it is their persistence which is of the greatest concern. Depending on regional geology, these organic pollutants can enter the marine coastal environment as part of riverine effluent or as part of groundwater intrusion. Upon having entered the marine environment, POPs incorporation in the food chain results in both bio-accumulation and bio-amplification processes. Their ultimate impacts can be measured in the reduction of growth rates, reproductive capacity and survival of all marine life. The impact on human health as well as the economic repercussions on the reduced marketability of various fisheries is obvious.

4. Mining Wastes

The location of mining facilities is subject to geological prosperity and is not dependent on free choice or proximity of markets. Accordingly, large-scale mines are designed for specific sites and the environmental effects are governed by site-specific factors such as the nature of the land : plain, mountains, hills, location of rivers, access to the sea; climate : rainy, arid; transportation infrastructure : rivers, roads, railways; population : dense settlement, relatively unpopulated, urban; land use : agricultural, industrial, rain forest; marine and coastal area : mangrove ecosystem, coral reef, sea grasses. The environmental effects of mining tend to increase both in geographical scope and intensity as exploration, extraction and metallurgical processing progressively advance.

The exploration phase, including mapping, geophysical and geochemical surveys and drilling produces only minor environmental effects such as clearing of trees for drilling sites, camps, access roads, sinking of pits, holes and shafts, and can be handled by relatively simple rules ensuring that no lasting danger or damage remains.

The mining or extraction phase involves more intensive operations, but the

impact is localized. Subsidence is a well known problem of underground mining, specially coal mining. The environmental impact decreases with the distance from the mining sources. However, modern large-volume low-grade mining uses only a very small percentage of mined ores.

The disposal of overburden can cause major environmental problems such as sedimentation of rivers (which can extend to hundreds of kilometers) and serious impact to the sea. Acid drainage from tailings dumps and the accidental overflow of water charged with hazardous chemicals, in particular cyanide used for leaching gold, and leachate from tailings can cause severe poisoning and can cause local, regional and in some cases cross-border pollution, leading to damage to the ecosystem and the human habitat. Major gold mine developments are taking place throughout the country, and although large operators are likely to protect the environment, the use of mercury in illegal small-scale mining causes chemical pollution of waters.

The main environmental degradation generated by the mining industry takes place at the metallurgical stage, mainly in smelting and refining. These industrial processes create air pollution by release of carbon monoxide and oxides of nitrogen and sulfur; water pollution through discharge of process water tailings and hazardous waste generated as residues metallurgical processes.

Waste arising from mining operation has caused pollution of some coastal and marine waters. The rinsing (cleaning) process of bauxite mining in Bintan Island, Riau Province, small-scale gold mining has caused some pollution to the surrounding waters. The rise water effluent disposal in marine environment has resulted in ecosystem destruction of some coastal areas, especially the mangrove forests, coral reef, sea grasses and has caused shallowing of the waterbody. In addition, dredging to reclaim the area has resulted in destruction of fish habitat.

5. Sediments

Main cause of sedimentation is the soil erosion. The erosive process is increased by poor cultivation systems, deforestation and by agricultural activities. Over silation due to poor cultivation and deforestation is one of the worst form of pollution of the aquatic environment in Indonesia. Dredging and mining activities in coastal areas are also major causes of sedimentation. In Java, surface runoffs and soil erosion are the main causes of flood in the lowland areas, resulting in destruction of irrigation systems and loss of topsoil. In Sumatera and Kalimantan, erosion also occurs due to deforestation practices and logging industries.

Indonesian territorial waters make up about two thirds of the entire territory. Indonesian waters may be divided into four parts, the shallow Sunda shelf in the west, the Sahul shelf in the east, the deep ocean in the South, and the deep seas, straits and channels in between. Nearly all types of marine topographical features are found beneath Indonesian waters, including shallow continental shelves, deep sea basins, troughs, trenches, continental slopes, volcanic and coral island.

A large proportion of Indonesia's export earnings has been generated

through the exploitation of its vast forest resources. A side effect of the forestry resources is that it represents a highly significant carbon-based component in the nation's economy.

B. Sea-based Sources of Pollution

Concern about oil pollution in Indonesia seas has increased greatly since early 1975, when the 273,000-ton tanker Showa Maru ran aground in the Straits of Malacca and spilled some 7,000 tons of Middle East crude into Indonesian waters. One major effect of this oil spill was the death of hundreds of hectares of mangrove forest off Dumai which showed little signs recovery after two and a half years (Soegiarto and Polunin 1982). Other oil spills through collisions have occurred; act to this can be added the accidental discharges from ships. The straits of Malacca are one of the busiest sea-lanes in the world, through which some 75,000 tonnage pass annually (Sand 1975). Therefore, further major oil spills are certain.

The oceans have long been considered to have a limitless capacity to receive and assimilate all types of waste. Rising public concern with environmental quality, particularly with respect to oil spills and residues led to demands for an end to dumping of waste in the marine environment. Beginning in 1972 with the Convention on the Prevention of Pollution at Sea from Shipping (MARPOL 73/78), a series of international and regional conventions have been established and brought into force over the following ten years.

1. Ports and Harbors - Maritime Transport

In many port areas discharge takes place of sanitary sewage, directed storm waters and industrial effluents into local waters. The result is a deposition of organic-rich fine-grained sediments within port areas and approach channels. Dredging of sediments is undertaken to maintain navigational depth, permit construction of various shoreline structures, wharves etc. or, obtain fill and construction materials. Through dredging and disposal of dredged materials considerable pollution of the marine environment may result.

Maritime incidents and accidents resulting in oil spills may have substantial temporary or long-term impacts, ecological or economic or both. During the past decade the world has become increasingly conscious of threats to the marine environment. In particular a number of large oil spills in the past have sparked the awareness of the need to regulate the prevention of and response to oil spills on a worldwide basis.

Ports are key links in the sea communications system. Scattered across the are some 300 registered ports, most of which serve internal transportation needs. The majority of exports and imports go through four major ports : Jakarta, Surabaya, Belawan, and Ujung Pandang. Sixteen ports can accommodate ocean-going ships and more than 100 serve inter-island shipping vessels. Jakarta has by the largest port for general cargo. Dumai in Sumatera, where the large oil fields are located, handles the largest volume of exports. Cilacap on the south coast of Java, handles oil from the Middle East.

Additional container facilities are rapidly being developed. Further containerization offers a significant opportunity to improve cargo handling efficiency and to reduce the costs of internal and external commerce. Tanjung Priok, Jakarta's largest general cargo port, has a container terminal and two five ton capacity cranes, each capable of handling 20 containers per hour. Container traffic has increased by an average of 45 percent annually at the port over the past five years. Container facilities for feeder vessels will soon be operating at Belawan in North Sumatera, Tanjung Perak in Surabaya, Palembang in South Sumatera and Pangkal Pinang in the Riau archipelago.

2. Sea-bed Exploration and Exploitation

Large reserves of oil exist, both onshore and offshore. In January 1985, estimated recoverable oil reserves stood at approximately 8.65 billion barrels (two percent of the world's total), and recoverable reserves of natural gas at the equivalent of 14.5 billion barrels of crude oil. Indonesia is a member of the Organization of Petroleum Exporting Countries (OPEC), and is the largest exporter of oil in Asia. Indonesia also has large reserves of natural gas and is now one of the world's leading producers and exporters of liquefied natural gas (LNG). Despite the slump in world petroleum prices, oil and gas operations are expected to continue to provide the major export and leading economic activity for some time.

Over one-third of national oil production presently occurs in offshore areas (especially the Java Sea and Makassar Strait) and another large proportion occurs in coastal areas. Offshore exploratory drilling is becoming more common. Oil fields tend to be small in size requiring continuous development of new fields to maintain national production levels. Important exploration areas include South Java Sea, the Strait of Malacca, South China Sea around Natuna Island, West Kalimantan, Makassar Strait, and South Sulawesi.

Offshore petroleum operations have many support activities in marine and coastal areas, including shipping (supplying drill rigs and offshore installations), onshore infrastructure, and support services. Most of the crude oil produced from offshore wells is transported through undersea pipelines to storage barge or land terminals. Oil is then pumped from these facilities to offshore single buoy mooring terminals where it is loaded onto tankers. There are nine oil refineries and three major oil terminals, all located in coastal areas.

Oil and gas operations are a source of employment and local business opportunities in engineering, rig work, supply boat operations, shore-based and warehouse work, oil field supply and contingency planning. They also serve as a leading sector for technological development and training in petroleum and production technology, data processing, sensitivity mapping and oil spill countermeasures. The development of support facilities and service industries is a major stimulus to coastal community development and to the development of ports and industrial facilities, including refineries and petrochemical plants.

3. Marine Dumping

Marine dumping, directly or indirectly to the sea, was experienced in the country and caused the more important sources of Marine Pollution, not necessarily in the order of importance, are : domestic sewage, dredge spoils, sewage sludge, oil spills and off shore production, industrial wastes, radio-active wastes, solid wastes, thermal pollution, shipboard wastes, sediments from over-land run-off, pesticides and herbicides, antifouling paint

In Indonesia, management of ocean Dumping was already considered recently, since the "Issue of Toxic Chemical Industrial Wastes" from other Countries (Europe and Africa) were looking for Dumping Locations in the Pacific and Indian Oceans.

Steps are needed while still in the process and visible Project were required to assess the feasibility and implementations of the said disposals by means of ocean dumping. Criteria and Procedures need to be established, while potential possible sites be identified like for instance:

- the territorial waters up to 12 miles, will be prohibited in this case
- as according to the existing rules and regulation of the Republic of Indonesia; while deeper parts in the Pacific and Indian Ocean - South of Java - more than 2000 will be alternatives of the priority investigation.

The central issue in all of these conventions and national legislation and regulations, has been the regulation and management of the release of contaminants of concern into the marine environment through the dumping of wastes at sea. Most contaminants originate from land-based sources, either point source (e.g., sewage or industrial effluents outfall) or non-point sources (e.g., general agricultural run-off and soil erosion entering via river run-off). While regulatory restrictions on the disposal of contaminated degraded materials serve to reduce the re-deployment of contaminants, they do not address the source of the problem. At-source control has been promoted by several nations through the Montreal Guidelines for Land-Based Pollutants, but this agreement is still very much in consultative state and is not in force. The same applies to a new convention initiated in Washington, D.C. in October 1995: the Intergovernmental Conference to Adopt a Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities.

Since oil and gas production is a major economic activity, numerous oil-carrying tankers operate in national waters. The Malacca and Makassar-Lombok Straits are also the major international oil tankers which may operate in the Malacca Strait, VLCCs (Very Large Crude Carriers) use the Makassar and Lombok Straits as the main route for transporting Middle East and African crude to East Asia and western North America. Approximately 25 to 30 VLCCs and 100 to 150 tankers use this route annually, and about 100 to 150 domestic tankers per month ship crude and refined petroleum products from the Balikpapan refinery and the offshore crude terminals in Makassar Strait. Tourist liners also use the Makassar and Lombok Straits.

IV. INDONESIA'S NATIONAL STRATEGY ON COASTAL AND MARINE ENVIRONMENTAL MANAGEMENT

A Management strategy for coastal and marine environment should not be separated from on-land environmental management strategies. It is necessary to integrate the existing activities on land and those in coastal areas to minimize conflicts of interest in utilizing natural resources and overcoming pollution of the seas originating from land. Ocean dumping in coastal and open waters should be under the control of national jurisdiction.

There is a need for more specific marine spatial planning including coastal waters in order to coordinate authorized activities. In addition, it is also necessary to differentiate the management of ecosystems in coastal areas from those of highsea areas throughout the Exclusive Economic Zone and waters bordering on other countries.

Essentially, land, sea, and air are considered as one unit in spatial planning. Spatial management in the marine area is necessary for managing various biological and non biological marine resources in support of sustainable exploitation.

There is a need for more regulations or mechanisms to control resources in coastal areas in terms of conservation and utilization. This is because in Indonesia, as one of the developing countries, natural resources in coastal and marine areas constitute strategic national assets for the development of basic capital.

An urgent need is seen for inter agency coordination at both the central and local levels, in view of unclear sea borders between provinces. It is also necessary to organize inter agency and inter regional authority and responsibilities in the short run while waiting for creation of an institution responsible for coordinating marine affairs.

There is a need to set priorities in marine human resources development in an integrated fashion for the central and local sectors in respect to types of need and capacity.

It is necessary to provide the public with an opportunity to participate more in decisions affecting coastal areas such as those concerning exploiting and monitoring marine resources. This is related to a special program to fight poverty in coastal villages.

It is necessary to define the marine borders between neighboring countries, especially in respect to fisheries to minimize conflicts in exploiting marine resources.

In the long term, it will be necessary to develop tidal energy, wave energy or OTEC (Ocean Thermal Energy Conversion) as alternative energy sources.

It is necessary to provide training for isolated coastal communities on appropriate and environmentally friendly technology, such as practical methods of seawater desalination, etc.

Proposed Coastal Zone Protection Strategy

The Indonesian Marine Conservation Program has proposed the establishment of 10 million hectares of marine conservation area by the end of the ongoing Five-Year Development Plan. Currently the process of establishment is

still underway.

It is expected that the Government can establish about 70% of the proposed areas. The selection of the marine conservation areas was mainly based on the Marine Atlas (Salim and Halim, 1984), and also on information from several agencies which are involved in marine activities such as fisheries, tourism, and marine research institutions.

The proposal for coastal zone conservation strategies is based on National Conservation Strategies which consists of three aspects; namely:

- a. **To maintain essential ecological processes and life support systems such as mangrove, coral reef, seagrasses.**
- b. **To preserve coastal and marine biodiversity for sustainable coastal agricultural development.**

This includes protection of samples of different ecosystems, habitats, communities, and species in reserves and provides the opportunity for harvesting or cultivation of new resources.

- c. **To ensure the sustainable utilization of species and ecosystems.**

Coastal Zone Conservation Strategies should be based on considerations provided by agencies concerned having various interests in the management and sustainable use of the resources. The Directorate General of Forest Protection and Nature Conservation has a mandate to act as a management authority and has the responsibility to protect and to manage marine and coastal environments for their conservation.

Basic Requirement

Basically a program strategy for coastal zone conservation should have severe minimum requirements and those can be included the following:

- a. Coastal ecosystems and their resources should be regarded as valuable material for the people.
- b. The management strategy, which has to be developed in each coastal zone area, should be planned so as to protect the natural conditions.
- c. Any construction development plan in a coastal zone should be approved by the government, and should be based on multidisciplinary research studies, particularly those pertaining to the impact on the local and regional environment and the social economic impact.
- d. In each coastal zone, any land-use conversion such as for fishponds, resettlement or agriculture should be considered carefully, particularly with regards to its possible negative impact on the environment.
- e. Any coastal areas allocated for industrial activities should be carefully selected in order to control possible changes in parameters of environmental factors, both physical and/or natural.

Indonesia's National Strategy for Land-based and Sea-based Control

a. Environmental Impact Assessment (EIA), is executed based on the Government Regulation No. 51/ 1993, which functions as a decision-making instrument regarding feasibility of a certain enterprise or activity by observing the aspect of environment from its first phase of planning.

b. PROKASIH (Clean River Program)

This program aims to raise the quality of river water so as to meet the standard of water quality in accordance with its respective uses. From 1989 to 1993/1994 Clean River Program activities have dealt with 31 rivers in 13 provinces. Operational realization of the Clean River Program has been affected by the regional administration through a ProkasiH Team established by the Provincial Government.

The Clean River Program or PROKASIH in Indonesia is the foundation for local and regional government enforcement actions regarding industrial effluents in the most industrialized provinces, which was focussed on decreasing the volume of major rivers; it could than mentioned here in this regard, that perhaps all of the rivers beyond this program could be stated as pollution hot spots. (See "list of provinces and rivers under the jurisdiction of PROKASIH). It is also meant that the surrounding areas on land, including the estuaries and tributaries of rivers will be included as pollution hot spots. While from the marine and coastal pollution point of view, the pollution & destruction, as stated in the environmental problems of the East Asian Seas region, consisted of several problems as seen on Table 1 and their causes as could be seen in table. The pollution hot spots and destruction areas for Indonesia could also be seen in the pictures showing sensitive and high-risk areas hereunder.

c. Small Scale Industries Impact Control

Some scale activities potentially produce waste that polluted to the environment. For example traditional gold mining, produce waste with high organic content or toxic and hazardous waste.

Because small-scale industry has limitation, the Government extends its assistance in dealing with the control of waste.

d. Environmental Damage Control

Environmental damage often occurs at mining activities. Uncontrolled sand and gravel mining in the river may cause of sedimentation and erosion.

e. Air Control from vehicles: Blue Sky Program.

Quality of air in Indonesia shows a tendency of getting lower, particularly in the big city or places with very high traffic density.

f. Marine and Coastal Pollution Control

Marine and coastal pollution will reduce the potential of marine and coastal resources in supporting development of Indonesia. Disposal of waste and chemicals and oil spills from tanker accidents creates a number of problems.

To address the problems, the following program has been designed and implemented:

- (-) Port and Hazardous Pollution Control Program
- (-) Clean Tourism Program for Coastal Areas
- (-) Development of Environmental Impact Management System for Oil Spills (National Contingency Plan for Oil Spill)

g. Hazardous Waste Management

Efforts to coastal hazardous waste include the construction of facilities for Hazardous Waste Management Center in some provinces in Indonesia and implementation of Emergency Response Systems in Industries.

Other waste programs include the "Clean Up" program, minimization waste program, development of regulation and development of public awareness.

h. Clean City Program (ADIPURA)

The President to the cities presents the Adipura Award and their people who have successfully maintained the cleanliness of their cities based on criteria determined by the central Government.

i. Cleaner Production Development

The intention of this program is to prevent and to reduce the waste of resources the process on production cycle, the goal of this programme is "zero emission", together with Ecolabelling / ISO 14.000. The program is concentrated on industrial sectors and available expected into other sectors in the future.

j. Environmental Audit Program

The environmental audit is a technical management tool that includes a systematic, documented and objective evaluation of how an organization's management system works to:

- (-) Facilitate management control of implementation of environmental impact control.
- (-) Study a company's policy of compliance with environmental regulations
- (-) Comply with policy and environmental management standards within a company.

Environmental audits are undertaken voluntarily by companies, with the exception that when pollution levels have already threatened the public interest, they can be made mandatory.

k. Implementation of Coastal Spatial Layout and Land-Use Plans

Coastal spatial layout and land-use plans should be based on the following process:

- (a). Planning and development objectives of each sector must be clearly designated. To achieve the objectives, good coordination, integration, and synchronization between various activities is needed.
- (b). Spatial layout and land-use allocation and the establishment of

national coastal area management plans for many users should be decided based on an integrated decision making process.

I. Establishment of National Coastal Water Quality Standard and Monitoring Sea Level Rise.

Indonesia is currently in the process of establishing coastal water quality standards and monitoring sea level rise. Initial drafts indicate that these standards and sea level rise will be based on the beneficial use of the coastal zone for:

- (a). Protection of marine life;
- (b). Protection of human health from the consumption of marine fish and shellfish;
- (c). Protection of recreational uses; and
- (d). Aesthetic considerations
- (e). Protection of the human settlement

It is recommended that beneficial use be designated and that the standards be based on the type of use for which the areas is designated. For example, if an area is designated as a "recreational use area", then the standards applying to it would be less stringent than a "preservation use area" but more stringent than an "industrial use area".

Also, it is recommended that due to the difficulty and expense involved in monitoring coastal zone areas, that only a few selected key parameters be included in the standards.

A Management strategy for coastal and marine environment should not be separated from on-land environmental management strategies. It is necessary to integrate the existing activities on land and those in coastal areas to minimize conflicts of interest in utilizing natural resources and overcoming pollution of the seas originating from land. Ocean dumping in coastal and open waters should be under the control of national jurisdiction.

There is a need for more specific marine spatial planning including coastal waters in order to coordinate authorized activities. In addition, it is also necessary to differentiate the management of ecosystems in coastal areas from those of highsea areas throughout the Exclusive Economic Zone and waters bordering on other countries. Essentially, land, sea, and air are considered as one unit in spatial planning. Spatial management in the marine area is necessary for managing various biological and non-biological marine resources in support of sustainable exploitation.

Diversification and intensification of economic activities to meet the growing demand for food, employment and shelter of the expanding populations have placed tremendous pressures on the coastal and marine environments. Pollution is one of the manifestations of such pressures; the coastal waters of the region are contaminated predominantly by untreated sewage, garbage, sediments, oils, pesticides and hazardous wastes from land-and sea-based activities.

Direct physical destruction or toxic of chemicals degrades many valuable and productive ecosystems. While the open seas and oceans are still relatively

clean, increasing maritime activities such as offshore exploration/production activities, make the oceans vulnerable to pollution, especially oil and chemical spills and discharges.

V. INFORMATION NEEDS FOR INDONESIA COASTAL AND MARINE ENVIRONMENTAL MANAGEMENT

To support the Sustainable Development of Indonesia's Marine and Coastal resources in a comprehensive management approach, Information must be accurate, comprehensive and readily obtainable by the coordinated efforts of many Agencies involved, such as Government Agencies, NGOs, Universities, Business Sectors and the Communities as a whole. These organizations or agencies are part of the information infrastructure, which is comprised of the organizational, physical and technical processes necessary to:

- acquire data through administrative systems (land, tax, demographic), remote sensing, hydrographic surveys, economic studies, and research;
- store data in computer databases and libraries;
- catalogue data for efficient storage and retrieval;
- process data (including analysis and compilation) to produce usable information; and
- disseminate information by physical and electronic means.

1. Information As A Strategic Resource

While most people recognize the importance of information, it is not typically viewed as a strategic resource. Yet, without proper information, development becomes more costly, more error prone, and less profitable. Examples of strategic nature of information include:

- the saving of billions of rupiah through obtaining information on: cost-effective designs, the damage to valuable resources that would be caused by a misinformed decision, or the unproductive activities that would result misinformed decision;
- the use information to make marketing decisions, identify opportunities for lower production costs, and determine optimum product quality, thereby increasing profits; and
- the use of information to reduce human resource demands and increase human productivity through minimizing duplication of effort and maximizing the amount learned from others activities.

The value of information and its importance in development must be recognized and supported by actions designed to developed an infrastructure capable of supplying accurate and comprehensive information on marine and coastal matters.

As on the scope of Information most analyses of marine and coastal development information requirements tend to focus on physical information needs, such as resources, roads, soils, and pollution levels. However, in order to support the comprehensive management approach four district types of

information are needed:

- a. physical : infrastructural-roads, settlements, telecommunications facilities, wharves, dry docks, or biophysical-soils, forests, fish, minerals, water quality, pollutants, hydrographic charts;
- b. economic : production, consumption, imports, exports, wages, product quality, trade flows;
- c. human : demography, occupations, skills, education; and
- d. administrative : policies, regulations, permits, licenses, deeds, tax assessments.

Access to many data sources is needed in order to obtain information in each of these categories. Since most information sources are beyond the control of individual participants in marine and coastal development, gathering information is a complex and difficult task. Yet, the weakest link in any of these information categories limits the quality of decision making.

2. Issues On Marine & Coastal Information Management

The sheer size of Indonesia's marine & coastal regions renders the volume and variety of data needed for comprehensive management almost unmanageable. Information is therefore, distributed in varying stages of acquire, age, and level of detail through many sources, both computerized and non-computerized. This reality must be considered when defining practical improvements to the information infrastructure needed:

a. Database

While a great deal of data on marine and coastal resources has already been collected, much more is needed. Additional data is being gathered using remote sensing techniques, such as aerial photography, satellite imaging and airborne gravity, as well as more traditional methods. These efforts should be continued on a project-specific basis.

This growing database constitutes a valuable resource that needs proper management for its value to be fully realized. In the short to medium term, marine and coastal development information needs will be more effectively solved through proper data management than through further data acquisition.

b. Information Awareness and Access

While the lack of quality data and the cost of collecting it are problems, a greater concern is being unable to find, process or physically access information that has been collected. These difficulties sometimes result in key decisions being made on the basis of limited information, which can lead to costly mistakes and missed opportunities. For example, the answer could not be found to the relatively straightforward question of how much oil passed through Malacca Strait in 1986. Yet, people felt that this information was available "somewhere".

For these reasons, resources should be allocated to strengthening data management in organizations, which already hold significant volumes of marine and coastal materials.

c. Efforts to Coordinate Information

The availability of marine and coastal information remains largely dependent upon the existing collecting and coordinating agencies. Organizations, such as BPS, Bakosurtanal, LIPI, LAPAN, are trying to coordinate information for authorized users in selected fields. University centers, such as the Indonesian Fisheries Information Service, maintain extensive collections and have access to computerized international databases. These and other organization are striving to improve the management of information within their jurisdiction.

Wherever possible, opportunities to strengthen and promote information coordinating agencies and libraries should be made.

d. Tools for Information Sharing and Analysis

1. Inefficient Manual Record Systems

There are a number of advantages to following a microcomputer improvement strategy after computer based systems are implemented, staff will be able to spend less time on data compilation and more time on data analysis and interpretation. Microcomputers assembled in Indonesia can be used instead of expensive foreign equipment. The software to perform such tasks in commercially available and would require minimal time (a few months) to set up, and the training requirements for accessing and updating these systems are not too demanding.

2. Machine Readable and Bibliographic Information

Whenever possible, machine-readable versions of all physical information should be stored as part of reports. For example, a floppy disk could be included in a report cover pocket readily allowing users to access the tables and charts contained in the report without needing to re-input the data. Furthermore, floppy disks can easily be reproduced and can be mailed or transmitted quickly and cheaply. As word processors replace typewriters in more and more situation, machine-readable versions will become increasingly available.

A method for ensuring that, wherever possible, machine readable versions of information are stored in databases should be developed as soon as practical.

3. The Need for Consistent Geocoding

Decisions in marine and coastal development are typical geographical based. A consistent means of geocoding is needed to permit overlaying of the four types of information (physical, economic, human and administrative) on a geographical area. For example, most physical data is collected by latitude whereas administrative data is gathered by Kabupaten, kecamatan or desa. Geocoding provides the means to relate such diverse data elements to the same physical location.

4. Geographic Information Systems and other Analytical Tools

Once quality data becomes available, Geographic Information Systems

(GIS), should be used it efficiently relate geocoded data to produce information in both graphic and textual formats, Using this tool, the researcher, planner, engineer or administrator can readily identify important facts, interactions and trends, and make decisions accordingly.

Other analytical tools, such as predictive modeling techniques, are available for predicting likely occurrences under a given set of events. Oil spill models are an example, although similar techniques can be applied to other problems, such as capital infrastructure development, the spread of pollutants and marketing questions. Simple microcomputer based spreadsheet tools and databases (costing approximately Rp.50, 000, -Rp.200, 000) also provide comprehensive analytical capabilities unavailable only a few years ago.

Significant progress has been made in developing relatively low cost image interpretation equipment, which promises to increase still further the effectiveness of data collected by remote sensing.

Data sharing among such analytical tools is straightforward and no problems should be expected.

5. Information Sharing /The Telecommunication System

Once data is in a machine-readable form, it can be accessed through a telecommunications network from various locations. This network has the potential to:

- Speed access to information
- Reduce duplication and transportation costs
- Provide the user with a convenient means to examine various databases at diverse locations and
- Permit experts to comment on specific question without time consuming and expensive travel.

e. Training Issues

The use of new information technologies will fail if users and operators are not properly trained. Approaches, which rely on relatively small scale and independent efforts, keep training requirements to manageable levels.

Most people who now work in information processing jobs (professionals, technicians, clerks, secretaries, and analysts) can readily learn the new computer based techniques. However, resistance to change or lack of motivation can present difficulties. Fears of job security, inadequacy, changing organizational power structures and stubbornness all result in resistance to technological change. While such problems cannot be totally eliminated, they can be avoided and their impacts mitigated through proper introduction, assurances and training.

f. Other Related Issue

While the basic components of the information infrastructure for marine and coastal development (databases, a telecommunications system, and various information coordinating organizations and libraries) are in place, the remaining operational problems are:

- poor cataloguing and retrieval systems, which “lose” information;

- the lack of a consistent and practical geocoding scheme;
- out-of-date and poorly accessible information in manual record keeping systems; and
- Unreliable telecommunications in many parts of the country.

Tools and analytical techniques can be used to process the data, once it is in a usable form.

3. Current Marine Data Information Management

- a. Types of marine data information:
 - raw data comprise marine geodesy, hydrography, oceanography, marine biological resources, geophysics, and marine geology.
 - Processed data consists of thematic data and beach topography manuscripts, and geodesy/ geography coordinates including a description thereof.
- b. Marine data information classification:
 - Highly confidential: data on strategic national resources around defense regions/ disputed areas, and military marine data on strategic regions/ disputed areas.
 - Confidential: conserved/ raw strategic resources data, research findings which have not been published within 2 (two) years of their acquisition, and marine data from strategic areas (defense and security bases at sea, drilling areas, strategic vital objects and inter-islands traffic).
 - Restricted : data concerning resource potential and data which have not been published within 1(one) year of their acquisition.
 - Ordinary : Data not included in items (1), (2) and (3).
- c. Functional Marine Data Centers
 - Hydrography and oceanography services of TNI AL : hydrography, oceanography, tide and geodesy data.
 - LIPI (Oceanology, Research and Development Center) : oceanography and marine biodiversity data.
 - Fisheries Research Development Center/Marine Fisheries Research Department : fisheries data.
 - Marine Geology Research and Development Center : geophysical and marine geology data.
 - Bakosurtanal : Marine geodesy position data, marine gravity data, tide data, data on satellite images, and a geography data base.
 - BPP - Technology : oceanography, fisheries, geophysics, marine geology and part of the hydrography data.
 - Meteorology and Geophysic Agency : maritime meteorology data.
 - LIPI Geotechnology Research and Development Center : marine geology data.
 - PPTMGB - Lemigas and Pertamina : Marine geophysics.

- Universities (Unpatti, Unsrat, Unhas, Undip, IPB, ITB, ITS, and Unri) : oceanography, fisheries and marine geology data.
- LH/Bapedal : environmental management and related matters.

4. Network Development

Initially, the development of Marine and Coastal Information Network (MACIN) should be directed by the coordination mechanism through an assigned information working group. Then, an existing information agency, such as LIPI, should replace the coordination mechanism, by taking on the tasks of overseeing network development and acting as an information referral center. This agency would be the focal point of the network.

- a. The Marine and Coastal Information Network requires strengthening in the following areas :
 - identifying the information needs of users in order to determine appropriate information sources or significant information gaps;
 - developing a computerized list of information sources, access procedures and available information;
 - studying areas of common interest; for example, geocoding schemes, conferencing systems, data standards and formats, and policies and procedures for maintaining machine readable versions of physical information;
 - improving cataloguing and circulation systems and databases where significant marine and coastal information resides;
 - designing and implementing simple microcomputer based alternatives to manual record keeping systems containing relevant marine and coastal data;
 - developing methods and procedures to identify opportunities for ancillary data collection in conjunction with approved projects; and
 - progressively improving informal information transfer through increased linkages between participants in marine and coastal development.
- b. Developing a National Marine Information Center and System
 Marine Data Management is managed through an information system network.
 - the responsibilities of each relevant agency include: data storage with facilities for access, data processing, data security, and easy, rapid data distribution as well as supervision and control.
 - Immediate standardization of existing data in accordance with a nationally agreed format.
 - Information on Archipelagic waters of 2.8 million km², Indonesian Regional Sea Waters of 0.3 million km², Exclusive Economic Zone (ZEE) of 2.7 million km². Total Indonesian Waters + ZEE = 5.8 million km², total numbers of islands of

- 17,508, shore line of 80,791 km should be confirmed.
- In anticipating Repelitas, especially in the marine sector, “A National Sea Data Information Center” is being formed.
 - A system for the management of “Marine data classification and distribution” should be established as soon possible, for quick, accurate, efficient, controllable/safe utilization.

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