Pollution Prevention and Management in the East Asian Seas

A Paradigm Shift in Concept, Approach and Methodology

Regional Programme for the Prevention
and Management of Marine Pollution
in the East Asian Seas

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1997

GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas

Pollution Prevention and Management in the East Asian Seas
A Paradigm Shift in Concept, Approach and Methodology

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Message from the Regional Programme Manager

Over the last two decades, countries in the East Asian region have taken positive actions to reduce and avoid environmental threats which are occurring as a consequence of economic development. Central environmental agencies have been established in a number of countries, some have developed national environmental and sustainable development action plans, a few have prepared and adopted Agenda 21 action plans and an increasing number are ratifying major international conventions. At the regional level, action plans have been formulated, such as the East Asian Seas Action Plans, the ASEAN Strategic Plan of Action on the Environment, ASEAN Cooperation on Transboundary Pollution, and the Regional Action Programme for Environmentally Sound and Sustainable Development, 1996 - 2000. Other regional action programs for land-based sources of marine pollution are currently being developed.

However, even with all of this planning and programming, it is apparent that coastal and marine pollution management issues are not a priority of most countries. Management strategies of environmental and resource management authorities remain sectoral in approach and regulatory in nature. Actions tend to center on problems that are visible and of immediate concern, and are thus geared towards responding to environmental crises. Regional action plans are not being effectively implemented, and as a result, pollutant loadings and impacts in the East Asian Seas, especially in coastal waters, are increasing instead of decreasing. Consequently, the existing national and regional efforts are not adequate or effective in arresting the continuing deterioration of the functional integrity of the marine environment.

These past four years, the GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas focused on developing and testing innovative frameworks for marine pollution prevention and management, as a vanguard to sustainable development of coastal and marine areas. Working models have been implemented at three demonstration sites for groundtruthing ICM and risk assessment/risk management systems, prior to packaging and transferring the knowledge, lessons learned and capacities to other locations in the East Asian Seas.

Working in partnership with national and local governments, industry, donor agencies, NGOs and organizations in the international community, the Regional Programme has verified the strategic environmental management frameworks at the three selected sites. And, even more significantly, the results have proven the acceptability and workability of the frameworks across levels of government, political systems, sectors of the economy, financial schemes and scientific, technical and legal disciplines. This is not to say that a model framework can merely be picked up from one of the sites and duplicated elsewhere, and success will surely follow. On the contrary, the premium lesson to be learned is the methodology of applying the framework within the political, economic, environmental and social conditions and circumstances which vary in nature and in individual and relative importance from country to country and from site to site.

The 1997 report has been prepared under the theme, "Prevention and Management of Marine Pollution in the East Asian Seas: A Paradigm Shift in Concept, Approach and Methodology". The paradigm shift outlined herein touches both the abstract and the practical aspects of the Regional Programme, ranging from changes in perception, to transformations in institutional arrangements, to new investments and partnerships in monitoring, mitigating and avoiding pollution. The new paradigm did not appear instantaneously, but has evolved over the period of the project, through trial and error, patience and the cooperation of many players in government, the private sector, academia and donor agencies. I do not believe that the new paradigm has evolved to a final form, but will continue to change shape and content with the growth and development of the region, and the experience of these stakeholders.

The 1997 presentation is a joint effort of the technical staff of the Regional Programme, and the contributions by Mr. S. Adrian Ross, Dr. Huming Yu, Dr. Gil Jacinto, Mr. James Paw, Atty. Stella Regina Bernad and Dr. Mario Delos Reyes, whose hard work in the preparation of the document are duly acknowledged. Sincere appreciation is also extended to Dr. Leticia Dizon, Mr. Jonel Dulay, Mr. Danilo Bonga, Mr. Cornelio Artienda and Ms. Delilah Padilla for their editorial and technical assistance in completing the report.

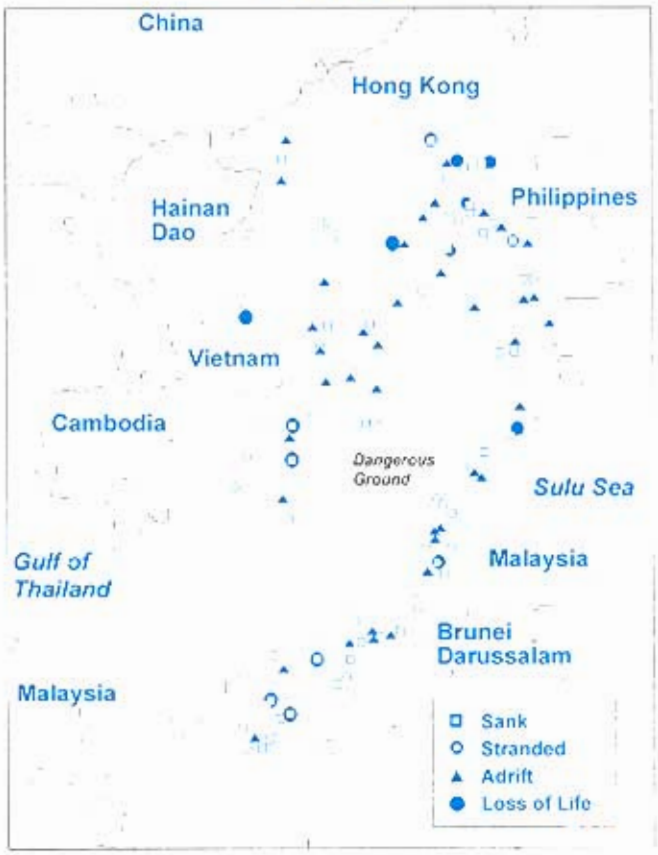
Dr. Chua Thia-Eng
Regional Programme Manager
GEF/UNDP/IMO Regional Programme
for the Prevention and Management
of Marine Pollution in the East Asian Seas

East Asian Seas Under Threat

The East Asian Seas are made up of five large marine ecosystems, having a total area of about 5.9 million km^2, and a 150,000 km coastline. The region is recognized as having the world's richest biodiversity, supporting one-third of the world's coral reefs and mangroves and producing 40% of the world's fish catch. However, it is becoming increasingly evident that these valuable resources are seriously threatened by pollution and other economic activities. An estimated 60 million tons of hazardous waste and roughly 80 billion tons of sewage are generated annually in the region. The region is a hub of maritime trade, with nine of the world's 20 largest container ports clustered within the shipping corridor between Singapore and Japan. As a consequence, maritime accidents occur, resulting in oil and chemical spillage which further threatens the marine and coastal resources of the East Asian Seas.

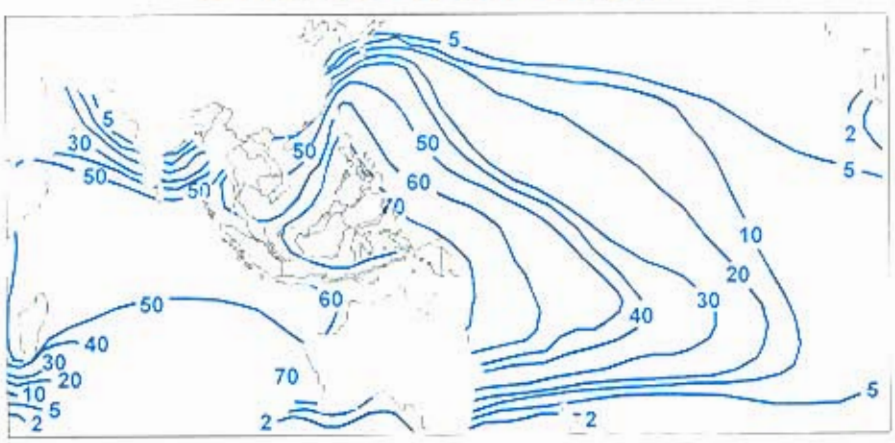
In addition to economic growth, the East Asia region has the world's largest population, about 1.8 billion people, 60% of which live in the coastal areas. It is estimated that three hundred million people currently live in coastal urban centers of the region. Many more live in coastal rural areas, more than half of which are women and children, largely depending on the sea for food and employment. Poverty in these areas, whether urban or rural, remains high. Poor people are often both the victims and agents of coastal and marine environment degradation. As victims, they lack access to clean water supplies and proper sanitation facilities, are exposed to various environmental pollutants and stand by helplessly as their primary source of subsistence is appropriated and degraded. As agents, they clear land of the very vegetation which prevents erosion, fish in overexploited fishing areas, use destructive fishing methods and destroy marine habitats for short-term economic gain.

Marine Casualties in South China Sea, 1974-1994*



Marine accidents result in oil and chemical spillage, which further threatens the marine and coastal resources of the East Asian Seas.

Scleractinian Coral Distribution



Figures refer to numbers of genera.

Hard corals have their center of diversity in Southeast Asia, particularly around eastern Indonesia, the Philippines and southern South China Sea.

*Olson, H. 1996. Marine traffic in the South China Sea, p. 137-153. *In* E.M. Borgese, N. Ginsburg and J.R. Morgan (eds.) Ocean Yearbook Vol. 12. The University of Chicago Press, Chicago. 632 p.

**Veron, J.E.N. 1995. Corals in space and time: biography and evolution of the Scleractinia. UNSW Press, Sydney. 321 p.

1. Programme Overview

Introduction

The GEF/UNDP/IMO Regional Programme for Prevention and Management of Marine Pollution in the East Asian Seas is tasked with a most complex issue. To meet the challenge, a number of innovative strategies and concepts have been developed and applied under the project. 1997 was a year in which the applied strategies began to show their value.

The application of integrated coastal management (ICM) at the demonstration projects in Batangas Bay, Philippines, and Xiamen, China, led to notable advancements in institutional effectiveness and efficiency at the local government level, the strengthening of local and national legislation, and the enhancement of enforcement programs and agreements regarding public sector-private sector cooperation in pollution monitoring.

Likewise, the Malacca Straits Demonstration Project contributed to the operationalization of a marine pollution risk assessment/risk management framework for subregional sea areas.

As part of the process, scientists in the Straits States collaborated on the development and testing of subregional mechanisms which will support the management of land- and sea-based sources of pollution.

In some of the complementary activities at the demonstration sites, the Programme was able to integrate environmental monitoring into the local marine pollution management framework, harmonize legislative conflicts, explore sustainable financing mechanisms and, above all, involve stakeholders, especially the private sector and the local communities, in the development and execution of site-specific or issue-related action plans. Through networking of legal personnel, the Regional Programme was able to create better awareness of the benefits, rights and obligations of international conventions related to marine pollution, resulting in a marked increase in convention accessions.

The Regional Programme experienced a number of firsts with regard to cooperation and collaboration among countries within the region, and sources external to the region. In the Malacca Straits subregion, for example, collaborative arrangements were completed with three institutions, Bogor Agricultural University (Indonesia), University of Malaya (Malaysia), and the National University of Singapore (Singapore), to collectively prepare a regional database and geographic information system (GIS) on marine and coastal resources and land- and sea-based sources of marine pollution. In addition, with the support of the Government of the Netherlands, a four-year program was implemented in Batangas Bay, designed to promote North-South and South-South cooperation and sharing of experience in urban waste management.

The Regional Programme also underwent two separate evaluations, one by UNDP and one by GEF, in 1997. The evaluations involved independent assessments of the Regional Programme's performance and achievements. The results of the evaluations were positive, drawing favorable conclusions with respect to Programme management, operating strategies and stakeholder participation, especially with regard to public-private partnerships and other sustainable financing mechanisms.

MONTH	SIGNIFICANT EVENTS/OUTPUTS IN 1997
January	• Adoption of local ICM legislation by the People's Congress of Xiamen • Launching of Regional Programme's Home Page on the Internet (http://www.skyinet.net/users/imo/)
February	• Establishment of a functional legal information database on marine pollution • Translation of "ICM good practices" into nine languages
March	• Agreement reached between littoral countries on joint effort to implement Malacca Straits Demonstration Project during a consultative meeting in Cebu, Philippines • Establishment of three new ICM parallel sites in Southern China with UNDP country IPF funding • Publication of Malacca Straits: Initial Risk Assessment
April	• Adoption of sea use zoning by Municipal Government of Xiamen • Programme mid-term evaluation • National workshops on IMO conventions, Hanoi and Ho Chi Minh City, Vietnam • Establishment of cross-sector marine environment monitoring program in Xiamen
May	• Completion of contingent valuation survey in Batangas Bay Region • Signing of MOA with UWEP for collaboration on the implementation of the Integrated Waste Management Action Plan in Batangas Bay Region • Publication of the Coastal Environmental Profile of Xiamen
June	• Oil Spill Response Training in Brunei and Thailand • National evaluation of Xiamen ICM Demonstration Project • National workshop on MARPOL in the Philippines • Initiation of Public-Private Sector Partnership Programme for Waste Management in Batangas Bay Region (collaborative project with UNDP)
July	• Subic workshop on the protection and management of the East Asian Seas • Batangas Bay Demonstration Project Evaluation Workshop • Comparative study on river cleanup in the Philippines, China and Singapore • MOA with Philippine Ports Authority on shore reception facilities
August	• Establishment of initial water use zoning scheme for Batangas Bay • Publication of proceedings of the oil spill modelling workshop in Pusan • Publication of proceedings of the sustainable financing conference in Manila
September	• Agreement reached between scientists of the three littoral states on common methodologies for resource valuation for the Malacca Straits
October	• Regional ICM training course in the Philippines, Xiamen and Singapore • Capacity building for ICM in the Philippines (new UNDP project in establishing 3 parallel sites) • Publication of the Malacca Straits Environmental Profile
November	• Presentation on the Regional Programme's progress and achievements: GEF Council, Washington, D.C. • Regional ICM workshop, Chonburi, Thailand • Second Technical Workshop of the Regional Network for Marine Pollution Monitoring and Information Management • Publication of GIS-oriented environmental atlas for Batangas Bay • Interns from Indonesia, China and Vietnam join Programme Office • Workshop on the development and application of risk assessment/risk management framework, Johor Bahru, Malaysia
December	• Regional training workshop on integrated environmental impact assessment, Hong Kong, PR China • Fourth Programme Steering Committee Meeting, Hanoi, Vietnam

Throughout the planning, development and implementation of the Regional Programme, a major emphasis has been placed on capacity building and information transfer. Although time and resource constraints limited the number of demonstration sites to three, the Programme undertook activities that ensured participation by all eleven countries, the wide dissemination of technical information and the sharing of the experiences gained at the demonstration sites.

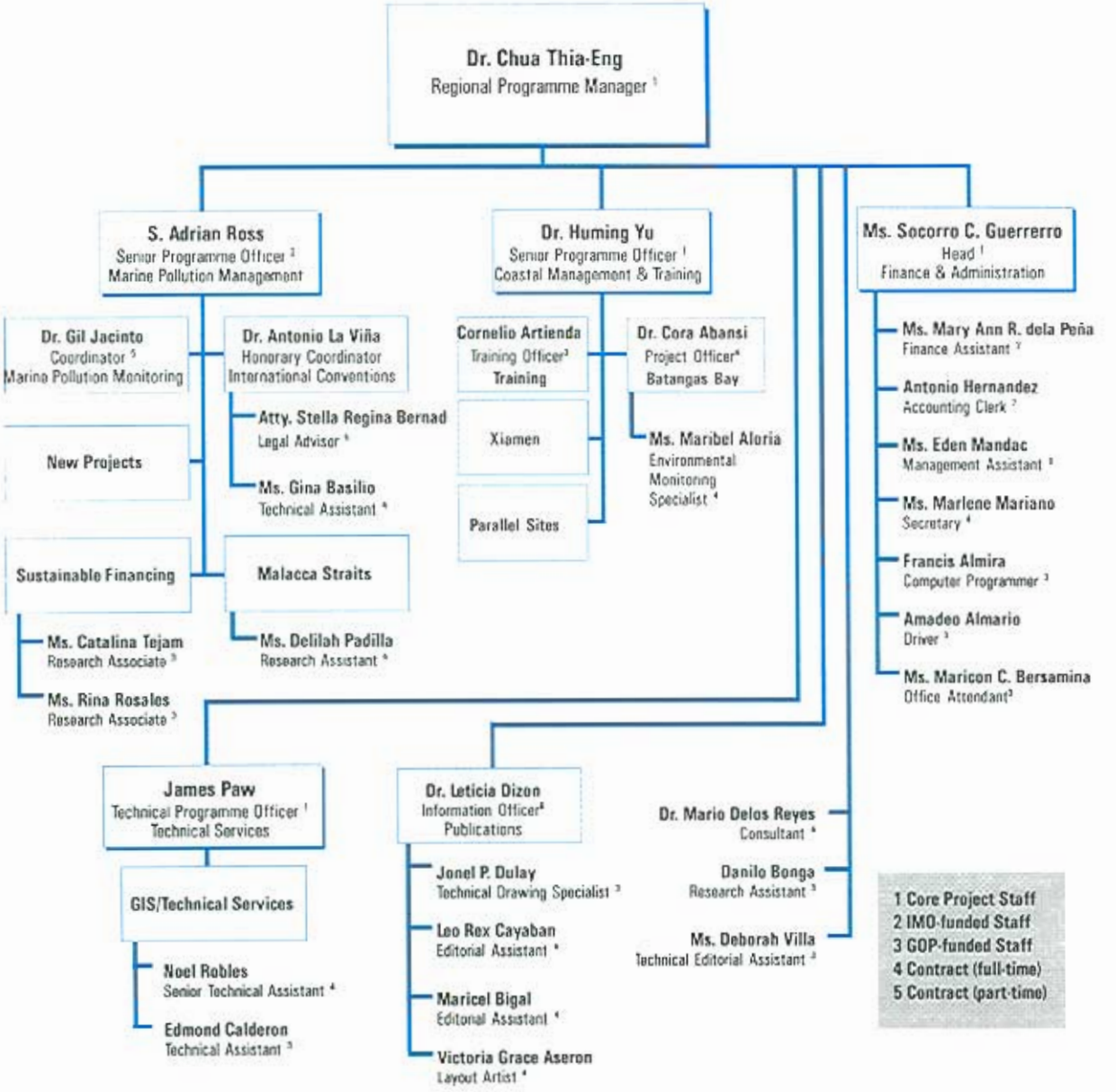
More than 800 individuals have participated in the 31 training activities, workshops and conferences which have been undertaken by the project, either alone or in collaboration with other agencies and institutions. Programme costs for publication and distribution of technical materials and project information, 70% of which are disseminated within the region, amount to more than US$150,000. The Programme's commitment to sharing knowledge and building capacity across the region have obvious results, both in contributions and benefits being derived by all participating countries of the Regional Programme.

Participating Country Contributions and Derived Benefits

	Brunei Darussalam	Cambodia	PR China	DPR Korea	Indonesia	Malaysia	Philippines	RO Korea	Singapore	Thailand	Vietnam
1. Training											
Oil Spill Response	✓	✓				✓	✓			✓	✓
ICM		✓	✓	✓	✓	✓	✓	✓		✓	✓
IEIA	✓	✓	✓		✓	✓	✓		✓	✓	✓
Internship/staff exchange		✓	✓	✓	✓		✓				✓
2. Workshops and conferences											
Marine pollution monitoring		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Marine legislation		✓	✓		✓	✓	✓	✓	✓	✓	✓
ICM Technical		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Risk assessment/risk management					✓	✓		✓	✓		
International conventions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sustainable financing		✓	✓		✓	✓	✓	✓	✓	✓	✓
Resource valuation					✓	✓			✓		
Oil spill modelling			✓		✓	✓	✓	✓	✓		
Public awareness and education		✓	✓				✓				
3. Equipment		✓	✓	✓			✓				✓
4. Publications											
Newsletters/Updates	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Technical Reports/Conferences	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5. Host of Programme events	✓		✓			✓	✓	✓	✓	✓	✓

The Programme Management and Development Office in Manila consists of three internationally recruited officers, namely the Regional Programme Manager and a Senior Programme Officer, as well as a Senior Programme Officer assigned full-time to the Manila office by IMO headquarters. The balance of the core staff includes a Technical Programme Officer and an Administrative Officer, as well as a Finance Assistant and Accounting Clerk, both of whom have been recruited locally by IMO. Other technical support is acquired on a short-term contractual basis to assist in research and in the implementation of Programme activities. In addition, eleven staff have been seconded to the project by the Government of the Philippines through the Department of Environment and Natural Resources (DENR). DENR has also made significant contributions to the Regional Programme as host of the Programme Office and as a major investor in ICM at the Batangas Bay Demonstration Site.

IMO Programme Development and Management Office Organizational Chart 1997



The Regional Programme further extended cooperative and collaborative working arrangements in 1997, including developments with both government and non-government entities. Memoranda of Agreement were signed with three universities, an NGO, a donor, three scientific/research institutions and five government agencies regarding such activities as purchase of marine pollution monitoring equipment, development of a generic socioeconomic impact assessment framework for ICM, implementation of national workshops on international conventions and completion of technical projects and studies.

A total of US$9.3 million has been mobilized since the start of the Programme, US$2.7 million from in-country sources in PR China, the Philippines and the Republic of Korea, and US$6.6 million from external sources, including donor agencies such as the Swedish International Development Agency (Sida), Canada's International Development and Research Centre (IDRC), and the Danish Cooperation for Environment and Development (DANCED). A significant advancement occurred in 1997, with the signing of an agreement between PR China and UNDP on capacity building for integrated coastal management in the northern South China Sea. A total shared commitment of US$3.4 million has been confirmed. A similar project initiative is being formulated in the Philippines and, if successful, will involve an investment of more than US$2 million in ICM by UNDP and the Government of the Philippines.

Mobilization of In-Country and External Financial Resources (1994-1997)

In-Country Resources	1994-1996 (US$)	1996 (US$)	1997 (US$)	1998 (US$)	TOTAL (US$)
Xiamen Municipality	552,000	276,000	552,000		1,380,000
Government of the Philippines	380,000	166,740	102,000		648,740
Batangas Provincial Government	8,000	180,077	231,327		419,404
SOA, China (International ICM Workshop)		3,840			3,840
OPRC Training:					
Host Country (Brunei Darussalam & Thailand)			22,700		22,700
Philippine Ports Authority			150,000		150,000
KORDI	25,000	39,000			64,000
SUB-TOTAL	965,000	665,657	1,058,027		2,688,684
External Resources					
Government of Norway (MARPOL Project)		160,000			160,000
UNDP/China (Capacity Building for ICM in Northern South China Sea (1997-2000)			3,427,729		3,427,729
SIDA/SAREC/CMC/IMO Joint Project (1994-1996)	650,000				650,000
SIDA-Supported Training Course/CMC	7,600	39,420			47,020
SIDA/CMC (Sustainable Financing Conference)	50,000				50,000
IDRC (Sustainable Financing Conference)	15,000				15,000
SIDA/CMC (International ICM Workshop)	50,000				50,000
DANCED (International ICM Workshop)	15,000				15,000
Philippine Coast Guard-PCG (ICM Workshop)			800		800
OPRC Training:					
Australia Maritime Safety Authority (AMSA)			12,500		12,500
East Asia Response, Ltd. (EARL)			12,500		12,500
WASTE (1997-1999)			600,000		600,000
PPP/UNDP			150,000		150,000
SIDA/CMC (1997-1999)			1,250,000		1,250,000
IMO			75,000		75,000
Training/Workshop/Consultancy Fee (1995-1996)		76,356			76,356
SUB-TOTAL	657,600	405,776	5,528,529		6,591,905
Potential Funding:					
Capacity Building for ICM (UNDP/Philippines)				2,032,000	2,032,000
GRAND TOTAL	1,622,600	1,071,432	6,586,556	2,032,000	11,312,589

2. Preventing and Managing Marine Pollution in the East Asian Seas: A Paradigm Shift

The legacy of the Programme for the region...

"The Programme addresse(s) the needs of the Region, and demonstrate(s) workable solutions through interventions that can be replicated by participating countries themselves especially in such areas as policy-formulation, coastal planning, institutional arrangements, pollution monitoring for management, sustainable funding schemes and capacity-building.

The Programme has also strengthened the EAS regional technical cooperation structure, extended it beyond the traditional ASEAN partners and broadened its scope to also cover the control of pollution from land and ship sources, coastal planning, coastal management, coastal environmental legislation and international conventions.

Each demonstration site has lived up to the Programme's expectations and all were used for extensive region-wide training. If the political will and commitment is there, the ICM approach can be replicated elsewhere within the region and beyond."

Excerpt from *Final Report* of the
Mid-Term Project Evaluation Team of Experts
April/May 1997

Over the past four years, the GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas has been at the forefront of initiatives aimed at developing, implementing and testing innovative planning and management frameworks for application at the local and subregional levels. These frameworks address not only marine pollution prevention and management, but also sustainable development of coastal and marine areas.

Overall Objective of the Regional Programme

To support the efforts of the participating governments to prevent and manage marine pollution at the national and subregional levels on a long-term and self-reliant basis.

Working models of the frameworks have been implemented at three demonstration sites under the Regional Programme. The demonstration projects were employed as a means to verify the management frameworks. The working models have also illustrated *a paradigm shift in concept, approach and methodology in addressing marine pollution.*

Conceptually, within the frameworks, marine pollution management is identified as the responsibility of both the public and private sectors and, more significantly, is packaged as an investment opportunity. Such a concept is markedly different from the conventional perspective that marine pollution management is the sole responsibility of government and therefore should be financed out of the public purse. The *approach* adopted involves the development of a comprehensive integrated coastal management (ICM) framework at the local level, and a risk assessment/risk management framework at the subregional level. The combination of frameworks is a key ingredient to effectively combating or avoiding marine pollution in coastal waters and subregional seas. The *methodology*

advocated entails the integration of various administrative, scientific, legal, communication and financial tools to maximize the effect and incremental benefit of management initiatives.

The application and field-testing of innovative features under these three components have been the focus of the Regional Programme, including:

1. innovative institutional arrangements for managing coastal and marine areas at the local level;
2. advanced legal mechanisms for local government;
3. integrated enforcement programs in the marine sector;
4. partnerships between levels of government, public and private sectors, donor agencies and the scientific community;
5. sea-use zonation schemes, integrated into land use plans;
6. management-oriented marine pollution monitoring programs;
7. local government model ordinances for ICM;
8. investment opportunities in marine pollution management;
9. information technology applications for local and subregional management situations; and
10. networking among public and private institutions on scientific and technical, legal and economic aspects of marine pollution, national regulations and the implementation of international conventions.

The 1997 report outlines the specific contributions made in each of these areas, and others, over the past twelve months. At the outset, it is essential to recognize that the methodologies and mechanisms that have been tried and tested were applied under political, social and economic conditions that are characteristic of the demonstration sites. The use of these instruments at other locations in the region, where such conditions vary, will require some adjustment or refinement of concept and methodology. However, as a result of the Programme's experience, there is growing confidence in the region that the frameworks do indeed work, and do so effectively.

The Paradigm Shift in Concept, Approach and Methodology

Conventional	Current Project
Concept	
Marine pollution management is the responsibility of the public sector and does not generate income for government.	Marine pollution management is the responsibility of both public and private sectors and can create investment opportunities.
Central government addressess pollution problems through national policies, programs and capability building.	Local government is provided with the framework, tools and skills for addressessing marine pollution problems at the local level.
Waste has never been viewed as a resource.	Waste is a resource.
Approach	
Routine removal of waste. Response to pollution crises.	Total management approach by applying ICM and risk assessment/management frameworks and processes.
Heavily relies on legislative controls including EIAs.	Preventive and management framework installed at the local and subregional levels.
Methodology	
Management instruments are applied in isolation and in loose coordination.	Integrates various institutional, legal, monitoring, scientific, communication and enforcement tools to maximize efficiency, effectiveness and incremental benefits.

3. Laying the Foundation for Change

"The (GEF pilot) project helped us to work out mechanisms for coastal multiple use conflicts. We now have a legislative framework. We have a management plan for actions. Our collaboration with scientists and professors is good. Awareness of people is quite different than before. People won't allow change to these processes. I can assure you that the government is able to carry on the project and continue the established processes on its own resources."

Mr. Zhu Yayan
First Vice Mayor of Xiamen Municipality, PR China
ICM Workshop, Thailand
November 1997

Reducing and Avoiding Pollution Impacts of Economic Development

Before the implementation of the project, Xiamen, People's Republic of China, faced a number of severe environmental problems as a result of government's policy to accelerate economic development. Some of these problems were already affecting the sustainable use of its limited marine resources. Examples were:

- causeway construction, land reclamation, destroyed habitats and silted navigational channels;
- overexploitation of fisheries resources and depletion of some fish stocks;
- urban effluents discharging directly into coastal waters; red tides and human health impact;
- unregulated mariculture activities in the port and harbor areas threatening navigational safety;
- coastal sand mining resulting in serious coastline erosion;
- increased vessel traffic and port activities without adequate oil spill response system endangering maritime safety;
- deteriorating environmental quality affected tourism development; and
- endangered species especially the lancelet, the Chinese white dolphin and the egret faced extinction.

Batangas Bay, Philippines, is an area which is earmarked for future industrial development. The deep water bay has a developing port which will grow into the second largest in the country. The bay is currently lined with more than 50 industrial plants including oil refineries, chemical manufacturing, food processing and ship building. The bay also supports the livelihood of about 1,000 fishermen. A part of the bay is used for tourism where the nearby coral reefs attract thousands of domestic and international tourists every year.

Industrial effluents, municipal sewage and organic wastes from agricultural activities discharge into the bay. As development takes place, increased risks of environmental degradation, due to increasing pollutant loading from land-based activities and oil and chemical spills from maritime operations and accidents are expected.

In 1997, the integrated coastal management (ICM) framework was consolidated in Xiamen and Batangas. Common elements of the framework at the two sites include:

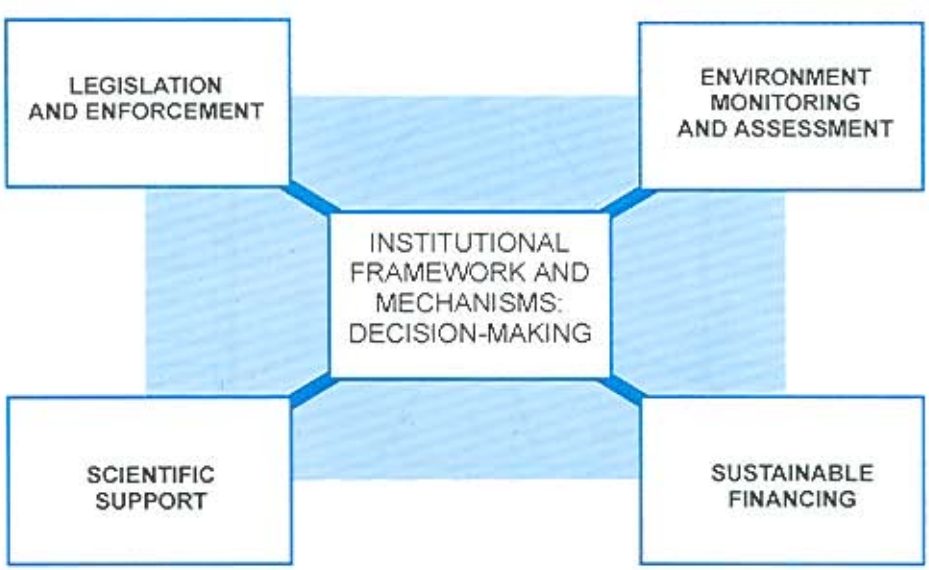
a) institutional arrangements and mechanisms;
b) legislation and enforcement;
c) environment monitoring and assessment;
d) scientific and echnological backstopping; and
e) sustainable financing mechanisms.

The two sites have different thrusts due to socioeconomic, political and cultural circumstances. Xiamen is renowned for its progress in interagency coordination and participation, while the Batangas site is heavily driven by public-private sector partnership.

ICM Good Practices

Based upon the successful working models of the two demonstration sites, a generic framework for ICM application has been developed. Guidelines for good practices, which were formulated as a result of an international conference on ICM, held in Xiamen, PR China, have been translated into nine languages namely: Bahasa Indonesia, Chinese, French, Korean, Portuguese, Spanish, Swahili, Thai and Vietnamese. The guidelines are being distributed widely within the region, as well as to countries outside of the region.

ICM System in Batangas and Xiamen: A Common Model



Establishing Institutional Mechanisms

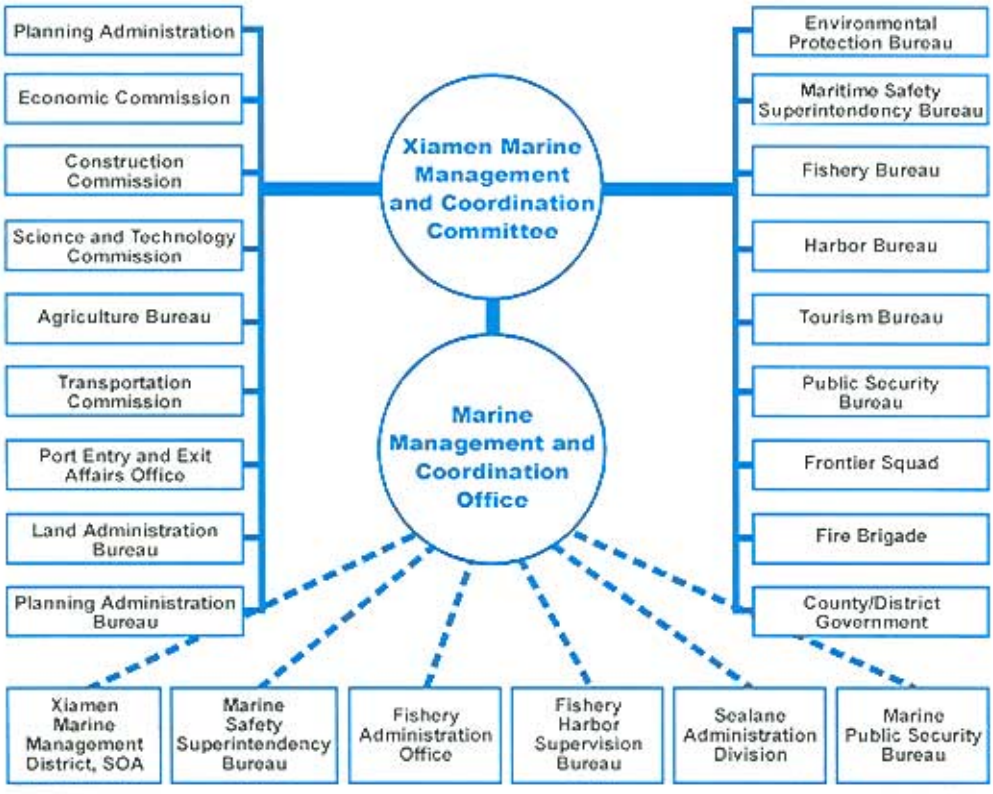
In Xiamen, an interagency management committee for coordination of marine uses and integrated management of marine environment has been set up and fully operationalized in the span of three years. The municipal government has strengthened its Marine Management and Coordination Office as the operational arm of the interagency committee.

In Batangas, an ICM council (i.e., the Batangas Bay Integrated Coastal Management Council) comprised of government agencies, coastal municipalities, industries and NGOs, has been set up for coordination and consultation on coastal development policies, and for the implementation of the strategic environment management plan for the Bay. The Environment and Natural Resources Office, a recently organized provincial government office, serves as the secretariat and operating arm to the Council.

In 1997, actions were implemented at the local level at both sites to consolidate the newly established ICM mechanisms. These mechanisms proved effective in forging stakeholder consensus, resolving conflicts concerning use of coastal areas and facilitating public participation in the decision-making. Some examples include:

- legislation on sea space utilization;
- related legislation on marine resource allocation;
- sea use zoning scheme;
- scientific investigation of management bottlenecks, such as carrying capacity of mariculture; and
- long-term Strategic Management Plans.

Organizational Structure for Marine Management and Coordination in Xiamen



Scientific Support

Science plays a critical role in ICM application at the two demonstration sites. Efforts have been made to link up science with decision-making in coastal development through various mechanisms and processes. In many instances, it has been a matter of ensuring that appropriate data are collected and packaged into products which can be used to address critical management needs.

Developing Linkages between Science and Management

A number of approaches have been employed by the Programme to improve the linkage between science and management:

- promoting a common understanding of management problems through a team work approach to completing environmental profiles, strategic management plans, functional zoning, etc.
- upgrading technical capacities of environmental management agencies;
- establishing legal requirements for public consultation and scientific input, especially environmental impact assessment;
- enhancing scientific understanding of the general public, local communities, NGOs and representatives in the legislative organs;
- maximizing application of scientific results through stakeholder participation in the review and adoption of major coastal projects;
- making information available to and useable by managers, e.g., management atlas, functional zoning, environment monitoring, environmental carrying capacity and coastal modelling.

Lesson Learned

Coastal environment and resource management projects, whether technological, engineering, financial or scientific, can be effective and sustained only when conducted hand in hand with improvement in decision-making mechanisms based on stakeholder consultation and participation.

Determining Environmental Carrying Capacity for Mariculture Development and Management

The total mariculture area in Xiamen (tidal flats and shallow seas) tripled from some 2,800 hectares (ha) in 1984 to 10,050 ha in 1995. Despite the sharp expansion in culturing area and increased investments, the annual production per ha did not show any significant growth, with 2.9 tons in 1984 and 3.1 tons in 1995. In fact, the annual production per ha dropped from its peak at 3.8 tons in 1993. Trend and regression analyses of unit production showed that the "maximum culture area" for sustainable mariculture in Xiamen is about 8,500 ha, suggesting a need for reduction of the culture area by 1,550 ha. This scientific assessment was considered during the development of the sea use zonation scheme in Xiamen. As a result, a portion of the sea area, the Western Channel, where shipping is the priority, was zoned for maritime shipping and mariculture was required to phase out.

Monitoring Network Moving Ahead

As part of the ICM framework, marine pollution monitoring is being built into local integrated coastal management systems. Efforts are being made to strengthen and network the site-specific ICM monitoring activities. Many ICM projects occur in environmentally strategic sites and monitoring results provide a useful profile on the changes in the marine environment. The networking of monitoring efforts is instrumental in identifying trends in environmental quality, in sharing experience among scientists, managers and other users of the coastal environment and in improving the effectiveness of management interventions.

The Regional Programme is developing a technical assistance program to encourage participation in a regional ICM monitoring network. The assistance includes the use of Internet as a platform for databases, technical advice and assistance, training of personnel and the provision of information. The commitment on the part of the participating ICM site is to implement a management-oriented marine pollution monitoring program, including selected critical parameters at each site, and to share the resulting data.

Improving Human and Financial Resource Use in Pollution Monitoring

The Xiamen Demonstration Project promoted the development of a multisectoral monitoring program involving several agencies with differing but overlapping mandates and functions. Previously, monitoring had been undertaken by five individual groups with little exchange of information. Monitoring technologies and methodologies varied among the groups, and the results obtained were incompatible. The demonstration project focused on developing collaboration among the five agencies and emphasizing the use of pollution monitoring information for strengthening management of the marine environment.

Consultation among the different monitoring groups led to a new arrangement under which an integrated marine environment monitoring program was formulated, intercalibration among participating laboratories conducted, personnel trained, use of equipment shared and monitoring data exchanged.

An operational monitoring program is now carried out by five government institutions and a state university. Under the ICM framework, the groups have rationalized their monitoring tasks and optimized the sampling and monitoring program so that their efforts complement rather than duplicate. Inter-comparison exercises among the participating organizations have shown that, except for a few parameters, the laboratories are able to obtain accurate and comparable results. The data acquired are now being assessed and will be packaged to provide guidance to the local government.

Lessons Learned from Xiamen

1. Institutions with varying yet complementary mandates on pollution monitoring need to be convinced of the viability and the usefulness of forging partnerships in pursuing a monitoring program. Much of this work may be dependent on the effectiveness of the "salesman" of the ICM framework in persuading various participants of the added value of integration and partnerships.

2. The selling points of developing partnerships in pollution monitoring include:

   a. better use of human and financial resources;
   b. improved monitoring and analytical capacities of participating institutions which, in turn, enhance the reliability of the data and information they produce; and
   c. sustainability of monitoring activities.

3. Support from the local and national governments is crucial. Fortunately, obtaining support from the government appears to have been facilitated by the group's adoption of a pollution monitoring framework linked to the management of Xiamen Bay. Thus, government sees the value of the monitoring effort and has been more than willing to support the monitoring activities.

4. The sustainability of the Xiamen pollution monitoring network rests on: (a) recognition of the obligations of each of its members; (b) agreements on data sharing; and (c) adoption of common standards. Other stimuli have emerged from within the network which enhance the value of the organization to its members, including: technical guidance and advice; staff training; and access to equipment.

Developing mechanisms to sustain marine pollution prevention and management is one of the most significant challenges being addressed by the Regional Programme. Why? Because while there is much written about economic instruments and market-based mechanisms, experience with respect to tried and proven modalities that work effectively at local, national and regional levels is wanting. Initially, the project consulted widely with economists, financial experts, participating governments, lending institutions and the private sector. The bottomline was, while there are many economic instruments to choose from, the application and groundtruthing of those instruments with respect to pollution prevention and management is limited and, in many instances, non-existent.

An international conference organized by the Regional Programme in 1996 provided insight into the successes and failures of financial mechanisms. Support services related to ports and harbors, waste management, environmental trust funds and damage compensation were the focus of case studies on financial sustainability, and these were discussed at the conference. From the conference output, it became apparent that two basic principles needed to be further explored and developed in order to progress toward sustainability of pollution prevention and management. The two principles are:

1. *identification and development of investment opportunities in coastal and marine management; and*

2. *promotion of public sector-private sector partnerships.*

The approaches follow the concept that marine pollution management is an opportunity, and therefore needs to be nourished, promoted and ultimately implemented as a sound financial investment. The process will involve changes in attitude by the different levels of government, the private sector, lending institutions, investors and donor agencies. At the crest of this wave of change is the issue of affordability from a sustainable development perspective, rather than desirability from an environmental perspective. For example, in Batangas Bay, investment requirements for waste management total more than US$75 million, while in Xiamen, municipal wastewater treatment facilities require an investment of over US$200 million. Such investments are directly linked to ongoing or proposed economic activities, but, at this point in time, have received only marginal consideration by government and project proponents alike. To make such investments a reality, it is necessary to learn the language of investors, and to gain an appreciation of the various avenues for financing projects.

Willingness-to-Pay: A matter of choice

To determine the residents' awareness and willingness-to-pay for improvements in environmental management, a contingent valuation survey was completed in the Batangas Bay Region. With the assistance of 19 graduate students from De La Salle University, trained and supervised by staff of the Regional Programme, the

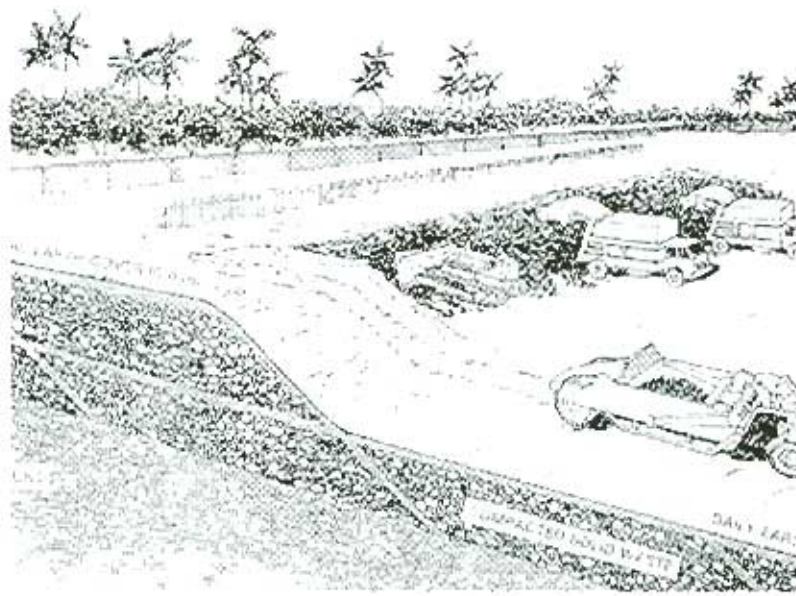


Illustration of a sanitary landfill operation, used in Batangas Bay Contingent Valuation Survey, 1997.

survey was administered over a 10-day period in 10 coastal and 16 interior municipalities of Batangas Province. Over 1,900 questionnaires were completed. The survey concentrated on four issues, namely: fisheries, corals, garbage and sewage.

Among other results, the survey showed a significant percentage of the population (>80%) is willing to pay more for collection and disposal of garbage, with the average payment indicated of the order of Peso 1,000 per year (current level around Peso 120 per year). One conclusion drawn from the survey is that residents of the Region are concerned about solid waste management, and are willing to pay for environmental improvements.

Developing Partnerships

Among the priority activities lined up in the Integrated Waste Management Action Plan for Batangas Bay is the development and implementation of the public-private partnership for the Bay region. The Action Plan has gained financial and technical support from various groups and sectors, both within and outside the region.

UNDP's Public-Private Partnerships for the Urban Environment (PPPUE) is an initiative that focuses on finance sourcing, technology, capacity building and management to meet the increasing demand for urban infrastructure services, particularly in developing economies, through its executing office, Sustainable Project Management (SPM) in Geneva, Switzerland.

Meetings among the Regional Programme, SPM and other focal points in Batangas Bay were held to discuss the development of Public-Private Partnerships in Batangas. A draft action plan for presentation to potential investors and/or lenders was prepared and subsequently approved by UNDP. As part of the action plan, investment opportunity briefs for management of agricultural waste, municipal solid waste and ship and port waste in the Batangas Bay Region will be prepared.

Round table discussions with potential investors/ lenders and national implementing agencies and regulators will be organized in the first quarter of 1998 to develop the foundation for a mixed ownership (public-private sector) company for management of wastes in Batangas Bay.

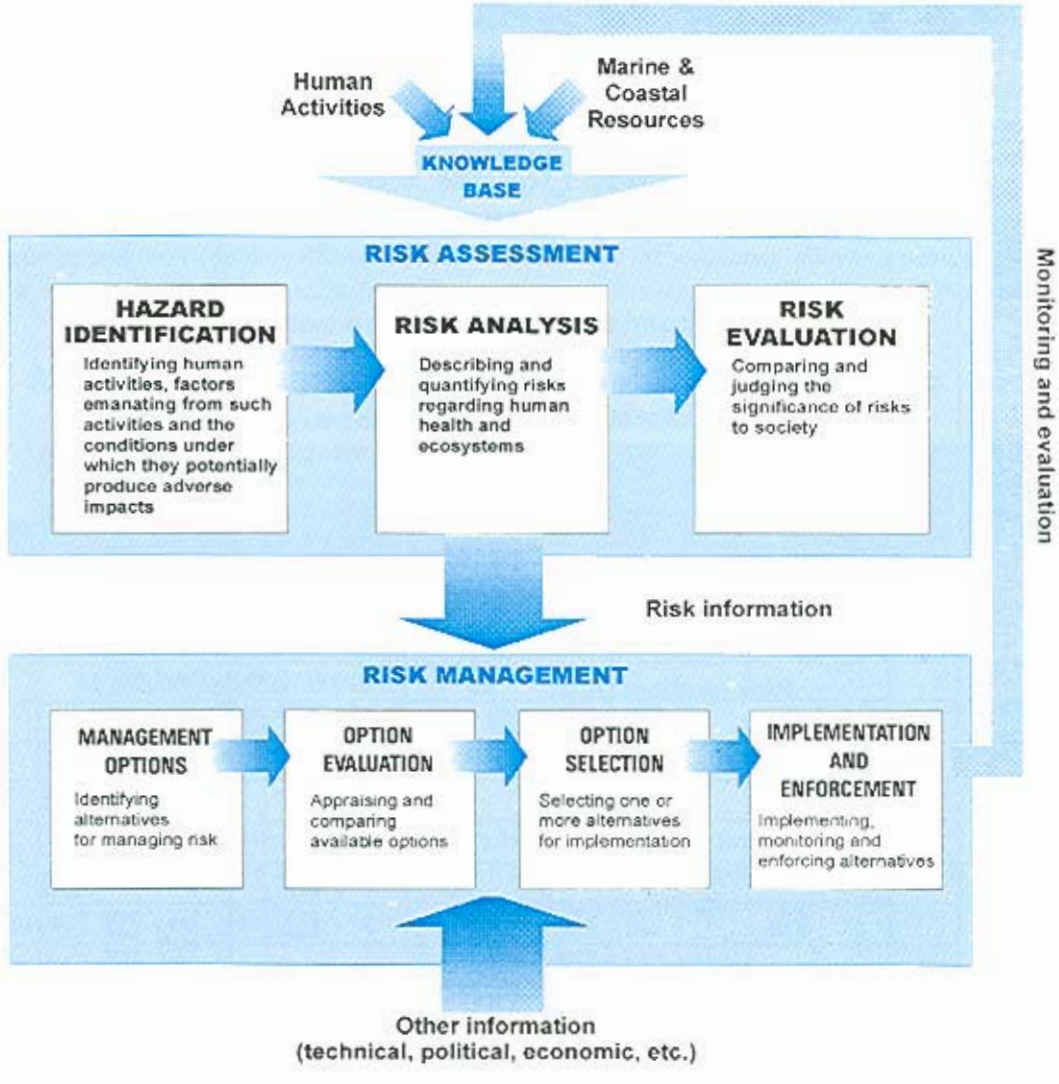
Malacca Straits Demonstration Project

The Malacca Straits Demonstration Project objectives are to identify existing pollution risks to the coastal and marine environment of the Straits, to strengthen surveillance and regulatory mechanisms and instruments for managing pollution in the Straits and to package the approaches, methods and the experience for use in other subregions where similar issues are apparent. Throughout 1997, the focus of activity was the development of a working model for assessing pollution risks from land- and sea-based activities, and identifying and evaluating management options for avoiding or reducing risks.

The working model for risk assessment, which was employed in the Malacca Straits Demonstration Project, involves a stepwise review and evaluation process. To start, an initial risk assessment was conducted, using the Malacca Straits Environmental Profile as the primary resource document, and employing simplified and worst case assumptions. The assessment involved marine pollution risk indicators related to the ecosystem and to human health. By determining the extent to which a particular pollutant exceeds a predetermined threshold value, it was possible to provide a general picture of pollution risks to habitats, marine resources (e.g., fisheries, including fish consumption) and human health.

The initial risk assessment provided both a retrospective and prospective appraisal of the situation. In the retrospective risk assessment, the analysis showed clear signs of impact on the ecological system, including declines in mangroves, peat swamps, seagrass and commercially exploited fish species. Most declines were attributed, reasonably, to physical removal for biomass or to make way for development.

Pollution Risk Assessment/Risk Management in Subregional Sea Areas



The aim of the prospective analysis was to estimate the probabilities with which activities, and the byproducts from them, are likely to cause harm to human health and ecological systems in and around the Straits. The "risk quotient" approach was applied in the analysis, in which the ratios of environmental concentrations, either measured or predicted, to threshold levels, such as existing water quality criteria, tolerable daily intakes (TDIs), etc., were calculated. Quotients above one signalled potential concern, whereas those below one signalled that problems were unlikely. The results of the prospective analysis pointed to specific heavy metals (i.e., copper, lead and mercury), oil and grease, total suspended solids, pesticides, tributyltin and bacteriological contamination as causes for concern indicating that a further more comprehensive assessment of these pollutants was required.

The next stage of the process involves refining the analysis on those parameters and targets for which problems were signalled. The refined risk assessment has been initiated, using more sophisticated approaches to predicting levels of the selected pollutants in the marine environment, and more realistic assumptions of scenarios wherein human and ecological targets are exposed to pollutants. The refinement process will also include a critical review of uncertainties associated with the numerator and the denominator of the risk quotient, leading to conclusions on the reliability of the data, and the probability of the risk.

Definitions for risk assessment/ risk management:

Environmental risk assessment is a systematic process for quantifying and describing the likelihood of harm to human health or ecosystems as a result of factors derived from human activities and reaching human or ecological targets through the natural environment

Environmental risk management is the process of selecting and implementing steps to alter levels of risk without undue harm to other societal values

Risk quotient (R/Q) = $\frac{\text{estimated exposure concentration (distribution)}}{\text{threshold no-effect concentration (distribution)}}$

Hazard is a potential source of risk, producing risk only if a pathway of exposure exists and if exposure creates the possibility of adverse consequences to a target

"We will...pursue the expeditious ratification of the significant international maritime conventions of the International Maritime Organization (IMO)...Many of these conventions, such as the marine pollution convention...and the facilitation of international maritime traffic convention have direct effect on our national economy, and the viability and competitiveness of a host of enterprises...The Ramos Administration will be reviewing the possible establishment of maritime attache posts [abroad] to service our interests in these important international maritime centers...We will...pursue the enactment of laws and regulations vital to the establishment of a strong and stable legal framework that will underpin the sustainable development of the country's maritime and marine resources."

H.E. Fidel V. Ramos
President of the Philippines
during the 1st Maritime Congress
of the Multi-Sectoral Task Force
on Maritime Development
25 October 1997

Within a span of three years, the number of ratified international conventions in the region has almost doubled. In 1994, there were 34 ratifications by the eleven countries participating in the Programme. At present, the number of ratifications has expanded to 64, with Malaysia and the Republic of Korea leading the way with a combined total of 12 accessions.

One reason for this progress is a new awareness of the benefits of the global instruments. Since 1994, political will and public interest in the marine and coastal environments in the East Asian Seas have grown, and international conventions are now clearly seen as a factor in the collective effort to protect the global ocean and its resources. The Regional Programme has

Ratification of International Conventions Relating to Marine Pollution in East Asia

COUNTRY	UNCLOS 82	MARPOL					London Convention		Intervention		CLC			Fund			SALVAGE 89	OPRC 90	BASEL 89
		73/78 Annex I / II	Annex III	Annex IV	Annex V		CONV 72	PROT 96	CONV 69	PROT 73	CONV 69	PROT 76	PROT 92	CONV 71	PROT 76	PROT 92			
Brunei Darussalam	96	86									92	92		92					
Cambodia		94	94	94	94						94								
China	96	83	94		88		85		90	90	77	86					94		92
DPR Korea		85	85	85	85														
Indonesia	86	86									78			78					93
Malaysia	96	97			97						95			95				97	93
Philippines	84						73						97			97			93
Republic of Korea	96	84	96		96		93				78	92	97	92		97			94
Singapore	94	90	94								81	81	97			97			96
Thailand																			
Vietnam	94	91																	95

Numbers in boxes refer to year of ratification/accession.
ratified 1994 and after

MARPOL 73/78: Progress in the Philippines

In the Philippines, a national review of MARPOL requirements has indicated a need for strengthening capacities in the following areas: national administration of MARPOL; shipping industry compliance; provision of shore reception facilities; and national implementing legislation. Actions have been identified, and these include the identification of a national authority and focal office; collection of data on the status of compliance among Philippine-registered ships, particularly those sailing domestic routes; the development of a compliance schedule for domestic vessels; conduct of a feasibility study on shore reception facilities; and the drafting of appropriate laws and regulations to implement MARPOL. These activities are well on their way.

made significant strides in this effort, through various workshops, a legal information database and a regional network of interested legal practitioners.

The International Convention for the Prevention of Pollution from Ships, or MARPOL 73/78 for short, will soon attain universality in the region. The remaining non-members of the convention, the Philippines and Thailand, are well on their way to ratification, with the Programme providing technical and legal support to the effort in the Philippines.

Another example is the new protocols of the liability and compensation conventions (CLC and FUND) which have gained their first three adherents in the region, although the majority of participating countries are signatories of the 1969 CLC. Singapore acceded to the CLC Protocol 1992 in November 1997 and the Fund Protocol 1992 in December 1997. The Philippines acceded to the 1992 Protocols for CLC and FUND in July 1997, at which time the Regional Programme contributed technical information and expert advice during the Senate Committee hearings. The Republic of Korea has also ratified the two conventions this year.

Aside from providing the necessary information relevant to international conventions, the Programme has developed an approach focused on the practical aspects of convention implementation. This approach recognizes the reality that the work does not stop with ratification. As in other parts of the world, many countries in the region base the decision to ratify a convention on the feasibility of implementation, therefore the two processes are intertwined.

The Programme examined the status of national legislation in the participating countries in relation to marine pollution conventions. This gave a realistic view of gaps and shortcomings. Other aspects which the Programme looked into were the financial, technical, organizational and coordination considerations and capabilities of countries in these areas. The Programme worked with national administrations to formulate Action Plans which lay out the initial steps for progressing towards improved implementation of conventions. The benefit to the country of taking these initial small steps cannot be underestimated, for to many countries the prospect of implementing the often technical and complicated pollution conventions is an intimidating hurdle.

Netherlands Supports Batangas Project

A six-year research and pilot project program on urban waste in the south, called the Urban Waste Expertise Programme (UWEP), funded by the Netherlands Government, is being implemented in Asia, Africa, and Latin America. The program aims to generate increased employment and income in Small and Micro Enterprises (SME) and improve the living environment of low-income communities. Through a consultancy firm, Waste, UWEP involves stakeholders, such as local and provincial government units, medium and large enterprises, non-government organizations, SMEs, individual entrepreneurs and community-based organizations, in north-south and south-south exchange of knowledge and experience.

The Batangas Bay Demonstration Project was chosen as one of four pilot project settings for UWEP. The pilot project will focus on several activities related to the integrated waste management action plan, which was prepared under the Regional Programme, such as:

- inventory and mobilization of local initiatives by communities and SMEs;
- development of an integrated sustainable waste management system;
- assessment of training needs;
- education and awareness campaigns;
- business opportunities; and
- pilot project implementation.

Sweden Joins Vietnam Effort

In Vietnam, the focus of a collaborative project with the Swedish International Development Agency, the Coastal Management Center (CMC) and the Ministry of Science, Technology and Environment (MOSTE) was the strengthening of technical and scientific capacities in marine pollution monitoring. Two oceanographic institutions, at Haiphong and Nha Trang, received laboratory equipment, training and expert advice for improving sampling and analytical techniques, as well as for ensuring appropriate intercalibration and standardization of sampling and analysis in marine pollution monitoring programs. Further collaborations are planned in 1998.

4. Groundtruthing Mechanisms and Instruments for Change

"The training course contributed to confirming many of my convictions, intuitions and "suspicions" about the essence of ICM programs, helped me understand the functioning of useful ICM instruments and techniques that were only known to me by reference (e.g., GIS), and changed also profoundly my perceptions with regard to several aspects of the ICM process, for example, the inter-relations between research and management."

H.E. Ambassador Fernando Gonzales Guyer
Ambassador of Uruguay
regarding his participation in the
Regional Programme's ICM training course
25 October 1997

The Regional Programme has developed and tested a number of innovative mechanisms which are designed to reinforce the feasibility and sustainability of the ICM and risk assessment/risk management working models at the three demonstrations sites, as well as complementary initiatives. During 1997, the results of the field-testing began to bear results. Highlights of some of the instruments and their application in the ICM and risk assessment/risk management frameworks are summarized herein under the headings of capacity building, pollution monitoring and partnerships at work.

Capacity Building

Capacity building is integrated into all components of the Regional Programme. With over 90% of the project activities being implemented by national professionals, an incremental and lasting benefit of the project is the core of expertise that is developing in the region.

The Regional Programme implemented the following formal training programs in 1997:

- internships;
- short-term technical training;
- in-service training;
- staff exchange; and
- study tours.

The internship program focuses on national professionals working in the project office to undertake specific technical and management-oriented activities, thereby improving their knowledge and skills in project planning and management, experience in working with interdisciplinary teams and interaction with colleagues in the region. So far, interns from Cambodia (1), China (2), Indonesia (1), DPR Korea (2) and Vietnam (2) have benefited from this program.

The Regional Programme also runs the following specialized short-term training courses:

- application of integrated coastal management for marine pollution and prevention;
- oil pollution preparedness, response and cooperation; and
- integrated environmental impact assessment.

For countries in need of additional technical support, the Regional Programme has provided in-service training. For example, training is provided through staff attachments to advanced laboratories in the region and through training courses. In-service training and basic laboratory upgrading have been provided to Cambodia, DPR Korea and Vietnam.

Almost all training courses are in collaboration with local educational institutions such that the developed curricula can be used for national training. Institutions have included the University of the Philippines, Xiamen University, National University of Singapore and City University of Hong Kong. Donor agencies, such as the Swedish International Development Agency (Sida) and Canada's International Development Research Centre (IDRC) have supported participants from developing nations outside the region to attend the Regional Programme's training courses.

ICM Training

To meet the regional demand for coastal environmental managers and implementers, the Third Regional Training Course on the Application of Integrated Coastal Management System in Marine Pollution Prevention and Management was conducted from 6 to 26 October 1997, in the Philippines, PR China and Singapore with 22 participants from 11 countries from the East Asia region, Africa and Latin America.

The ICM training program is primarily aimed at training coastal planners and managers. It is unique in that participants receive training at the demonstration sites in Batangas Bay and Xiamen. They also travel to Singapore to learn about the successful experience in river cleanup, waste disposal and port management. The course has been operational for three years and participants from 10 countries of the region, as well as participants from South Asia, East Africa and South America have benefited.

Oil Spill Preparedness and Response

Oil spills pose a major threat in the East Asian Seas. The Regional Programme organized and conducted the Subregional Training Courses on Oil Pollution Preparedness and Response Cooperation (OPRC) for Supervisors and On-Scene Commanders. The courses were conducted for the Gulf of Thailand, in Bangkok on 15-20 June 1997, and for the southern South China Sea, in Brunei Darussalam on 22-27 June 1997, respectively. The training courses aimed at strengthening national and regional capacities and cooperation to effectively respond and combat oil spills. The course was designed in accordance with the IMO Model Courses for Level 2-Supervisors/On-Scene Commanders, providing the basic response strategies and tactics, as well as the organizational planning skills required of operational supervisory staff in tackling major oil spills.

The training courses were supported by IMO London, the Australian Maritime Safety Authority (AMSA) and East Asia Response Limited (EARL), Singapore. Participants came from the four littoral countries of the Gulf of Thailand, namely: Cambodia, Malaysia, Thailand and Vietnam, and the four littoral countries of southern South China Sea, namely: Brunei Darussalam, Malaysia (Sarawak and Sabah), the Philippines and Vietnam. A total of 44 participants attended the two training courses.

Contributing to the successful conduct of the training courses were the support and cooperation provided by the Harbour Department, Ministry of Transportation and Communications, Government of Thailand, and the Marine Department, Ministry of Communications, Government of Brunei Darussalam.

Integrated Environment Impact Assessment for Coastal and Marine Areas

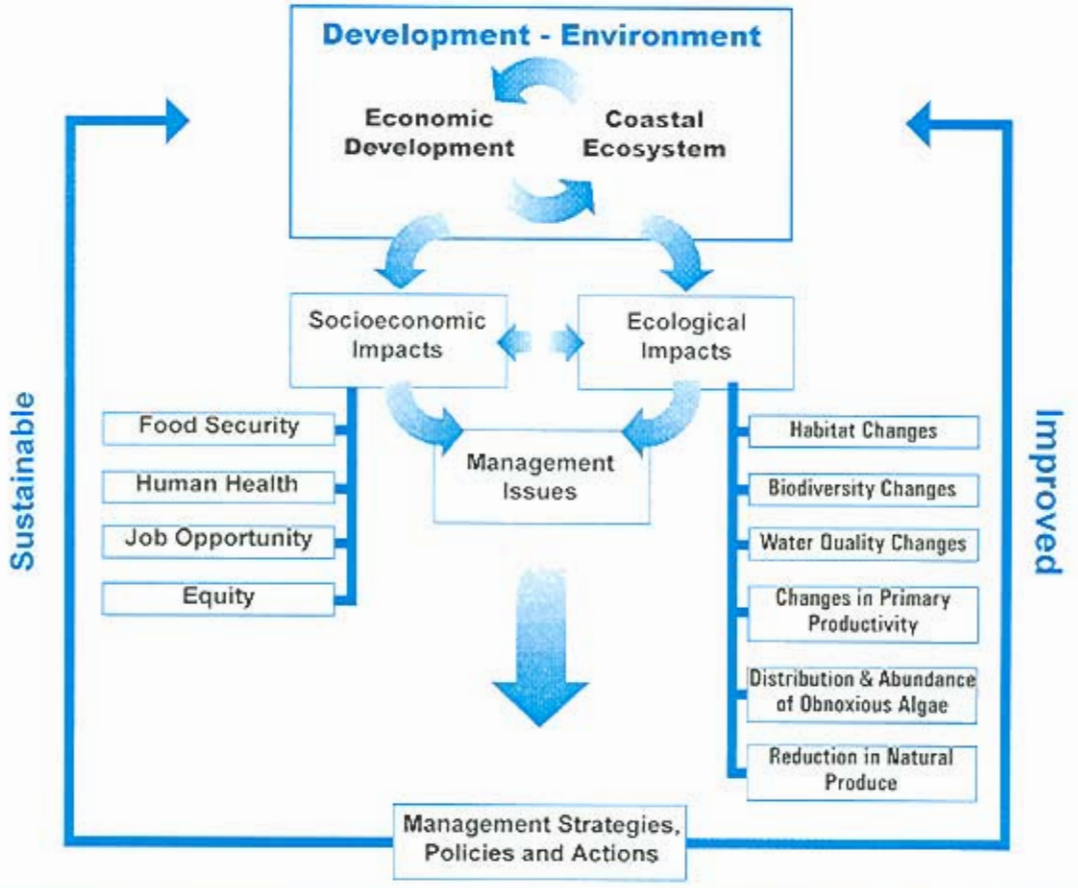
The first Training Workshop on Integrated Environment Impact Assessment (IEIA) for Coastal and Marine Areas, was held from 2 to 7 December 1997 at the City University of Hong Kong. The workshop was organized by the Regional Programme and the Coastal Management Center (CMC), in collaboration with the Swedish International Development Agency (Sida) and the Center for Environmental Science and Technology of the City University of Hong Kong.

The training workshop was designed to train officials/administrators handling EIA, coastal planners and academics, on the concept, scope, methodology, implementation and benefits of IEIA. The purpose is to emphasize the concept of IEIA in planning and development in the region. A total of 21 participants from nine East Asian countries attended the workshop.

IEIA Produces Results

In Xiamen, the methodology for integrated coastal environmental impact assessment was tested. The assessment looked into the nature and extent of impacts on the ecosystem from coastal activities, and quantified the economic effects associated with those impacts. The assessment identified priority issues and areas that call for management interventions. The information and analysis generated during the assessment enhanced scientific knowledge and input to the development of local legislation on the uses of marine space and their conflicts, marine use zoning and a project on pollution mitigation in Maluan Bay.

Methodological Framework for Integrated Ecological and Socioeconomic Impact Assessment



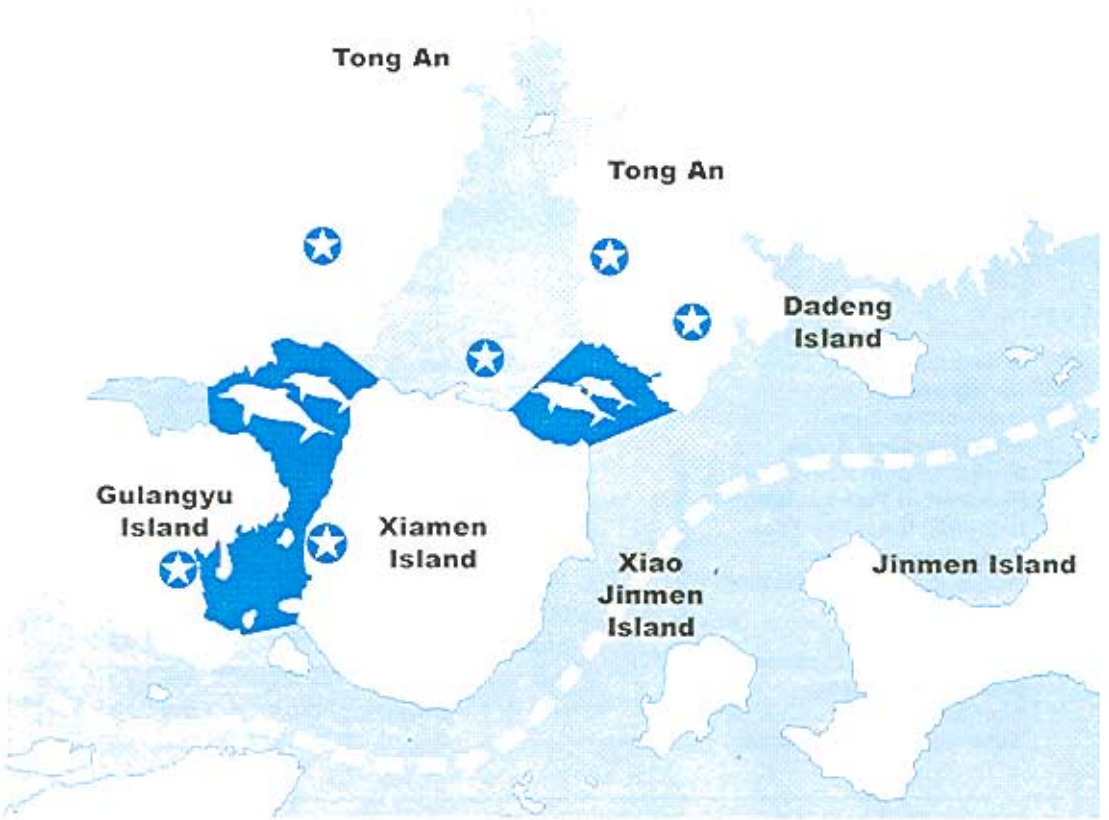
Xiamen Nature Conservation Zonation

In Xiamen, marine protection areas are identified for endangered species such as the egret (the symbol of Xiamen City), lancelet (*Branchiostoma belcheri*), a marine species considered a living fossil for the study of evolution of Chordata and Chinese white dolphin (*Sousa chinensis*). The dolphin has been found frequently in Xiamen waters over recent years, particularly in the Western Channel where shipping is given priority. Rather than declaring the whole Western Channel as a nature reserve for the dolphin which would exclude shipping lanes under the existing law, the municipal government has designated an area of 5,500 ha as a core protected area and put in place a set of special regulations to protect the dolphin.

Nature Conservation Zones for Chinese White Dolphin *(Sousa chinensis)* in Xiamen, China

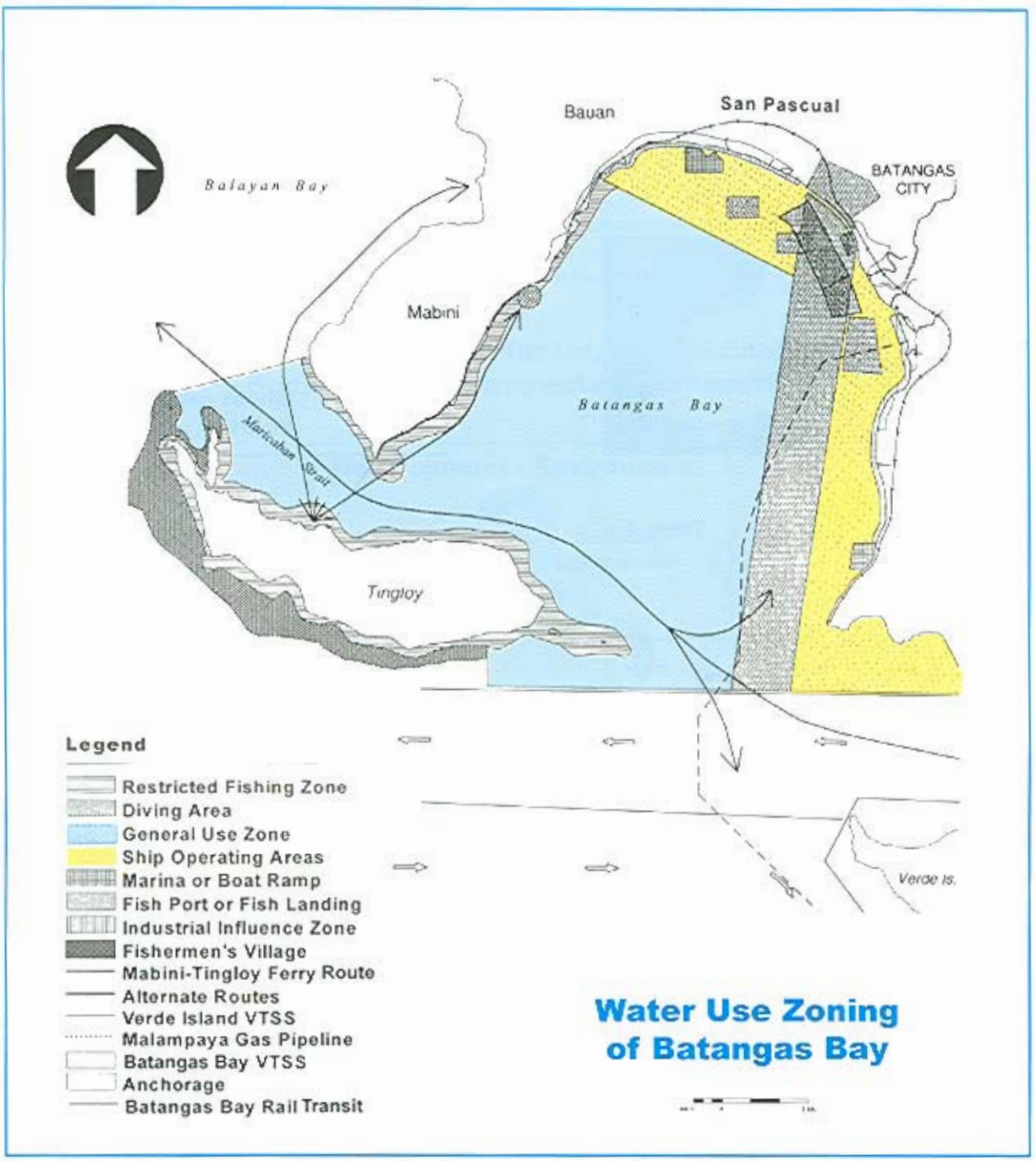
***Sousa chinensis* Nature Conservation Zone**

Observation Point



Batangas Water Use Zonation

In Batangas Bay, the zoning approach to coastal lands and waters was initially inspired by the land use planning. The objective of zoning efforts in Batangas was to help classify ecosystem function-based development zones through evaluation of environmental and socioeconomic features of coastal/marine areas. Short- and long-term effects of the uses were also compared. The zoning scheme is based on the best available scientific information and has helped in long-term planning for sustainable development.



Hydrodynamic Modelling: A tool for planners and managers

A three-dimensional circulation model was developed and applied to Batangas Bay by the Marine Science Institute of the University of Philippines. The purpose of the model was to study the water movement processes that control transport of pollutants, providing information needed for environmental contingency planning and pollution risk management. An oil spill trajectory model was also applied to simulate hypothetical oil spills from the locations of the oil refineries in the Bay.

The models were employed in the drafting of land and water use zonation schemes, and in the preparation of development plans in the coastal area.

Surface Pollutant Dispersal Model Output (Month of September)

Tidal currents in Batangas Bay are not strong enough to flush pollutants from waters in the northern part of the Bay. Overall, it is the effect of wind that eventually dominates the speed and direction of the surface water movement and the flushing of pollutants.

Maps for Managers

The Environmental Management Atlas of the Batangas Bay Region is a practical tool for planners and managers. It is available in hard copy, in recognition of the fact that not all entities in the area have access to GIS. The Atlas is unique, differing from conventional printed atlases in several ways:

- maps in the Atlas are of three types—basic maps which are digitized paper maps, maps generated from interpolation of point data, such as bathymetry, and maps generated from modelling activities, such as pollutant dispersal;
- each map has a corresponding text which describes its contents, its relevance, source and quality, including technical information about the contents obtained from reports, map analysis and modelling in the GIS;
- all the maps are in greyscale and enhanced by hatching and shading, with each geographic entity designated by alphanumerics which, when overlaid or reproduced, maintains its clarity;
- grid transparencies at three map scales are provided to enable users to locate a geographic entity (e.g., a town), measure its distance relative to another geographic entity, as well as its area and perimeter; and
- the Atlas can be updated on a regular basis. It is linked to a GIS database which is maintained locally by the Provincial Government Environment and Natural Resources Office (PG-ENRO).

Model Developed for Selecting Landfill Sites

In support of the Integrated Waste Management Action Plan, the Regional Programme developed a computer model to identify potential sanitary landfill sites in the Batangas Bay Region. The model was based on the GIS database of the bay region. Eleven maps with a total of 92 parameters were used in the topological overlay process, involving the application of multi-criteria evaluation (MCE) techniques. MCE allowed comparison and evaluation of physical, geological and hydrogeological conditions, an assessment of location with respect to built-up areas, roads, surface waters and other strategic features, and accounting of proposed lines of action in light of multiple criteria and conflicting land use considerations.

Several suitable sites were identified by the model. Followup onsite hydrogeological assessment was conducted at three of the identified sites. From the model, the Balayong site was identified as the most suitable and this was confirmed in the followup assessment. Based on the results of the model and the field investigation, the Bauan Municipal Government is presently negotiating land purchase in Balayong.

Reducing or Avoiding Pollution Risk

Risk management procedures to deal with shipping accidents, though well developed in the Straits of Malacca, are somewhat reactive. They are intended to deal with accidents once they occur. The Regional Programme envisages the use of more forward-looking systems in order to reduce pollution risk, and in 1997 continued to support the development of a "marine electronic highway" demonstration project in the Straits.

The marine electronic highway involves emerging technologies which improve the navigational decision-making of mariners. It includes a network of national electronic nautical chart databases, produced according to international standards. The network supports a suite of technologies which are revolutionalizing the navigation world, enabling ship board guidance systems to fully benefit from continuous, real-time

positioning information generated by a Global Positioning System. This is a new world of precision navigation which, with the addition of a land-based Differential Global Positioning System, can achieve vessel positioning accuracy within the range of 3 to 10 meters.

In congested shipping lanes such as the Malacca Straits, the potential benefit of precision navigation in reducing and avoiding maritime accidents, and thus the risk of marine pollution, is obvious. The initial risk assessment for the Malacca Straits estimates that the chance of a major oil spill (i.e., >1,500 tonnes) occurring in the Straits is 0.0029% of the number of tankers passing through the Straits. In 1993, there were more than 99,000 vessels using the Malacca Straits, and roughly 33% of these were tankers. Using the 1993 traffic figures, the estimated occurrence of a major oil spill is one per year. There were 32 maritime casualties in the Straits in 1993, nine of them involving tankers, and one involving a major spill (the *Maersk Navigator*). Within a two-month period in 1997, three separate maritime accidents occurred in the Malacca Straits, resulting in the loss of life and, in a collision between an empty super tanker (*Orapin Global*) and a fuel oil tanker (*Evoikos*), resulting in the spillage of 25,000 tonnes of fuel oil.

With such losses in mind, not to mention the costs associated with combating and cleaning up oil spills, the potential damage to local resources and the resulting impact on economies of the coastal communities, the marine electronic highway makes practical sense as an oil spill prevention strategy in the Straits. The system has merit from a commercial perspective too. The potential to enhance the efficiency of shipping and cargo movement through the Straits is well apparent. The transfer of technological advancements to the littoral States is a further benefit to the national stakeholders.

Cooperation and partnerships are required to make the marine electronic highway emerge from a paper study to reality. The littoral States, the shipping industry and the International Maritime Organization continue to be key players in the creation of the regional highway system. The Regional Programme will continue to act as a catalyst in the developments of the project.

Assessing the Risk of Shipping Accidents in the Straits

The relationship between tanker traffic and number of casualties in the Malacca Straits has been a subject of discussion at recent conferences in the region. The Malacca Straits Environmental Profile, which was published by the Regional Programme in 1997, contains information showing that both the number of tankers and the number of tanker accidents increased with time over the period 1982 to 1993. However, there is only a weak correlation between tanker traffic and number of accidents. Nevertheless, by computing the risk of accident as the number of tanker accidents/total number of tankers passing through the Straits, and plotting this against number of tankers passing through the Straits, it was determined that risk as a percentage of the number of tankers passing through the Straits per year is relatively constant at 0.029% (±0.03 at 95% confidence limit). Another side of the issue, the effects of a spill in the Straits, will depend upon a number of factors, including type and volume of cargo, proximity to critical habitats, current regime, weather and so on. The overall risk of an adverse ecological effect depends on a combination of these separate probabilities, which is being further evaluated within the risk assessment framework, developed as part of the Malacca Straits Demonstration Project.

As part of the effort to assess the fate of priority pollutants entering the Malacca Straits, a hydrodynamic model is being developed. Two complementary packages are included, an oil spill dispersion model and a pollutant fate model. The models will be used to assess the incremental benefits of proposed risk management options and contingency plans for pollutants in the Straits.

The oil spill model takes into consideration surface wind, tidal currents and streams, oil slick spreading and oil slick evaporation and dissipation. It will predict the trajectory, the area of coverage, the surface concentration and the point and time of impact along the shore, and covers both stationary and mobile spill sources in the Straits. To complement the functionality of the oil spill model, a database of oil spill combat equipment and manpower available for spill response at facilities, ports and terminals in the region is being incorporated into the system.

The oil spill and pollutant fate models and the database on oil spill combat equipment will be integrated into the regional database system and GIS on coastal and marine resources in the Straits of Malacca.

Oil spill model showing the predicted oil spill slick resulting from the collision between the *Orapin Global* and the *Evoikos*, October 1997.

Putting Values on Marine and Coastal Resources

Viewing natural resources as assets provides a useful perspective on resource management. It encourages consideration of all benefits, and all costs, of risk management decisions. It also encourages thinking about sustainable management of resources. Assuming that the goal of society is to gain the largest net economic benefit from the use of coastal and marine resources over time, developments or programs that maintain the value of natural assets are preferred over those that do not.

Fish cages such as this in the Philippines can be easily affected by oil spill or pollutants from land discharge.

It is relatively straightforward to describe the benefits and costs of risk management options in general terms, but quantifying benefits and costs can be difficult. Several methodologies have been developed which can be used to value the services provided by natural resources. These methodologies were reviewed and discussed among scientists and economists of the Malacca Straits subregion at a workshop in Malaysia in September 1997. A consensus was reached on the valuation of mangroves, corals, seagrass, seaweed, mudflats, beaches, fisheries and aquaculture and sea lanes in the Straits area. Work then began on the valuation of each of the identified resources in accordance with the services provided within the Straits. Preliminary results confirm the significance of the marine and coastal resources to a wide variety of users and beneficiaries within and outside of the subregion.

Legal Network Gets New Instruments

The Network on Legal Aspects of Marine Pollution, established in March 1996, is proving effective in the exchange of legal concepts, knowledge and experience among network members.

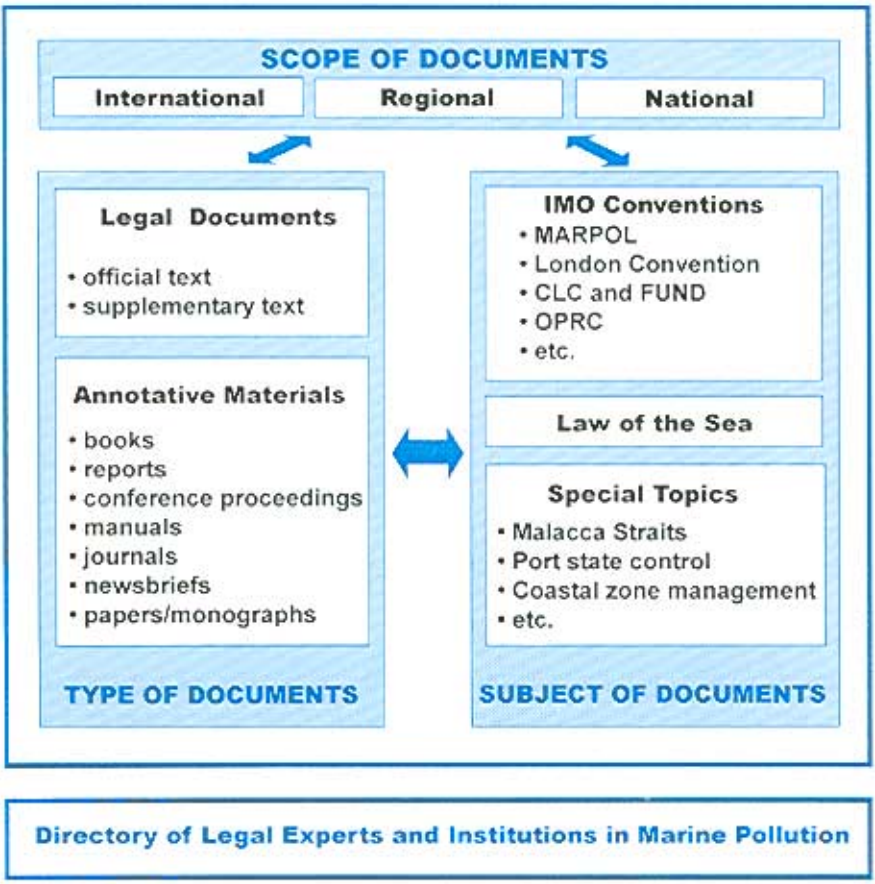
Tools have been developed to enhance the capacities of network members to work with their governments for ratification and implementation of international conventions. Network members both participate and benefit in the preparation of these tools.

One instrument is the Legal Information Database. The Database contains over 600 reference materials relating to marine pollution, including the texts of international and regional conventions, national legislation, and articles, books and other materials relating to marine pollution. The computerized Legal Information Database Reference Catalogue (LIDRC) has been made available to network members for reference. The materials themselves are housed in the Regional Programme Office in Manila.

The national legislation in the database has been reviewed by the Regional Programme, and the results provide a good background on existing legislative structures among participating countries.

Another tool which has been produced is a collection of Guidelines for National Legislation on Marine Pollution. The guidelines are designed to bridge the gap between international conventions related to marine pollution and national legislation on marine pollution, and are based on the obligations and standards of international conventions.

Schematic Representation of the Contents of the Legal Information Database



"The Programme has laid solid foundations for a regional approach to coastal and marine environmental monitoring ...The strong interest in monitoring evident in many participating countries is healthy provided that it is accepted that monitoring is not an end in itself, but only a tool towards pollution management strategies."

Excerpt from the ***Final Report*** of the
Mid-term Project Evaluation Team of Experts
April/May 1997

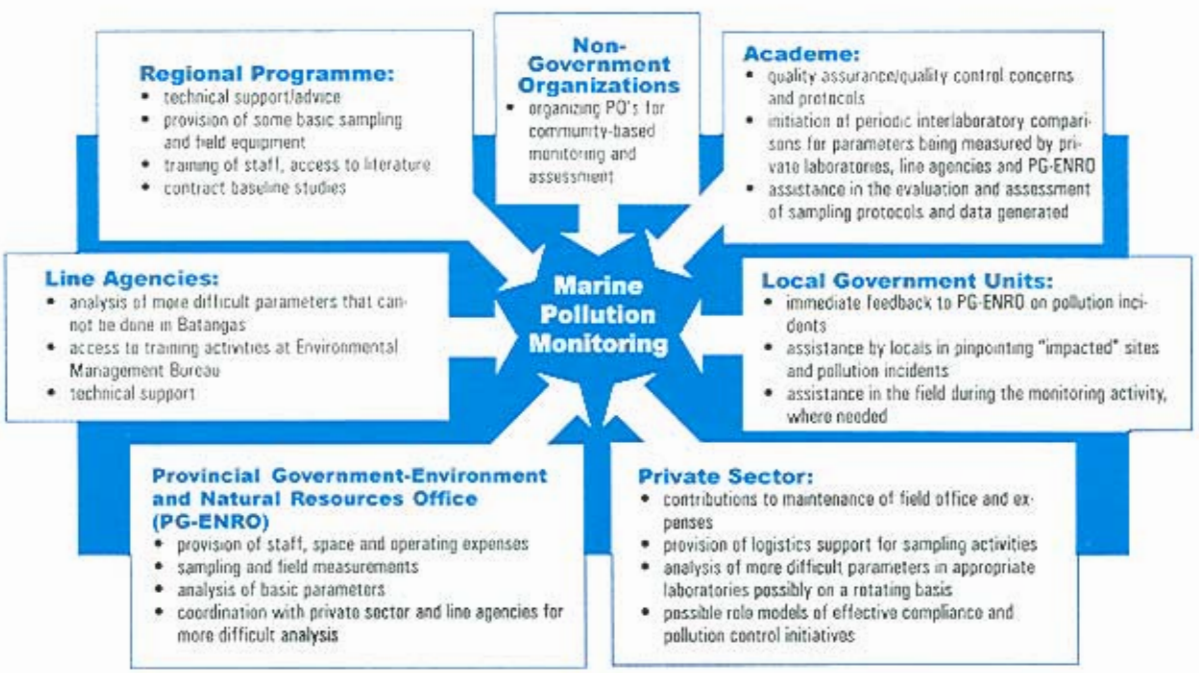
Developing Capacity in Batangas

Baseline water quality information on Batangas Bay is extremely limited, simply because there has been no consistent monitoring effort in the area. The establishment of the Batangas Bay Integrated Coastal Management Council changed the situation. The Council provided a forum for dialogue between and among levels of government, government agencies and private industry on the need for and utilization of monitoring information. Participation in the monitoring program was envisioned to include local and national government agencies, private companies operating around the bay, academic institutions and other non-government organizations.

The resulting pollution monitoring program was developed to target selected critical issues, problems and parameters at specific sites; input into the formulation of cost-effective strategies to address environmental concerns; and involve the various users and custodians of the marine environment in the monitoring, safeguarding and management intervention processes.

The consensus among the players was that, initially, the monitoring program should focus on environmental monitoring rather than compliance monitoring. Thus, the data acquired and assessments made of the quality of Batangas Bay would be focused on designated uses of the Bay.

Multisectoral Monitoring Program in Batangas



The Provincial Government of Batangas has provided and refurbished a small building to house the laboratory of the PG-ENRO, hired two chemists and provided a budget for the maintenance and operating expenses of the laboratory. The Regional Programme has purchased equipment for the laboratory.

Seven private companies have expressed interest and willingness to participate in the monitoring program, particularly in the analysis of selected environmental parameters. Local academic institutions have also indicated their desire for involvement in the sampling activities. The water district and the provincial health office have likewise expressed willingness to provide analytical services at subsidized rates to the monitoring program.

Baseline studies on water quality of Batangas Bay and major tributaries have been conducted and full implementation of the trend monitoring activities will commence in early 1998.

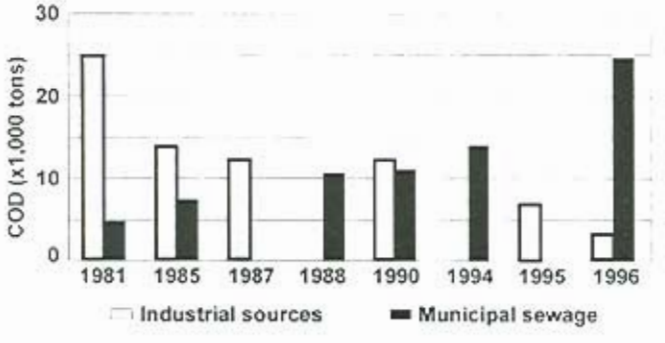
Marine Pollution Monitoring Confirms Achievements in Xiamen

From 1980 to 1996, the GNP of Xiamen increased by 20 times and the population doubled. However, these have not led to a corresponding level of deterioration in marine environmental quality due to effective management interventions.

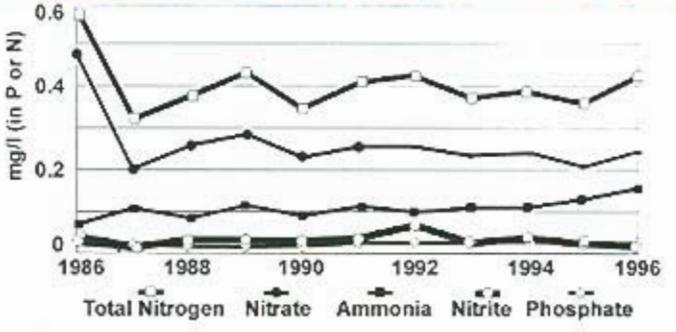
Within the Western Sea area of Xiamen, variations in average concentrations of nutrients have occurred over the past ten years. The average levels of nitrogen and phosphate, which are believed to trigger red tide occurrence, were 0.100 mg/l and 0.015 mg/l, respectively. Average concentrations of total nitrogen, nitrate and phosphate in 1996, although beyond the red tide thresholds, were lower than those in 1986. On balance, nutrient concentrations levelled off during the past ten years, except for a slight upward trend for ammonia which merits attention. Red tide events were observed in the Western Sea of Xiamen in 1986 and 1987, but not after 1990.

The levelling off of nutrient levels is believed to be a direct result of pollution management interventions. From 1981 to 1996, the total amount of COD discharges from industrial sources into Xiamen coastal waters was reduced from 25,100 tons to 3,200 tons. Nevertheless, the amount of COD from municipal sewage discharges increased from 4,900 tons to 25,000 tons. The cumulative effect was that the total amount of COD remained at the same level.

COD Discharges in Xiamen Coastal Waters, 1981-1996



Average Nutrient Levels in Western Coastal Waters of Xiamen, 1986-1996



Cleanup of Yuan Dang Lagoon: a success story

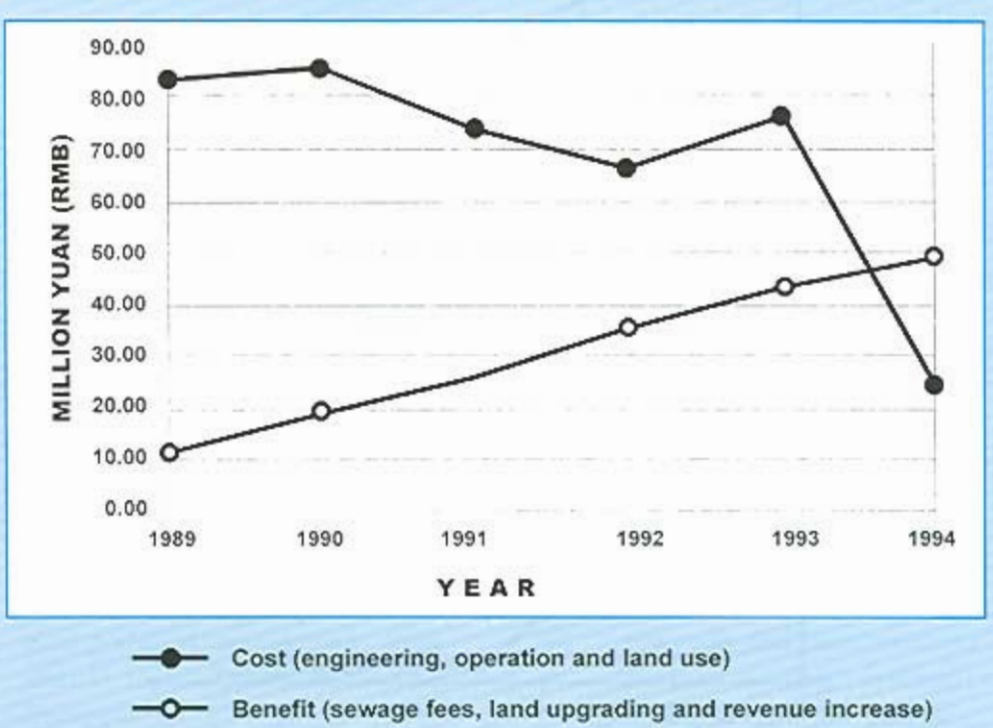
Yuan Dang Lagoon in Xiamen was a fishing harbor before 1970, covering an area of more than 10 km^2. After a causeway was built at the lagoon mouth, the lagoon became an enclosed catchment of industrial and municipal waste discharges and, eventually, biologically dead.

In late 1980s, the local government launched an integrated cleanup project involving construction of sewage treatment facilities, restructuring of surrounding drainage systems, dredging, increasing water exchange and developing and landscaping of the embankment. The cost of the investment is estimated to be US$25 million. A lagoon management unit was created to coordinate the cleanup effort.

Monitoring results show significant reduction of COD and heavy metals in the lagoon since the cleanup operation started in 1989. The water quality now reaches national standards for fisheries.

In 1997, the area has become a new city center for international and domestic investments, tourism and residential development. A survey under the Xiamen Demonstration Project found that over 53% of 173 investors located in the area listed "beautiful environment" as a major reason for their choice of investment. In addition to social, recreational and aesthetic benefits, the cleanup project has resulted in a net economic gain since 1994. An analysis of long-term benefits versus costs of cleanup of the Yuan Dang Lagoon shows that investment in the environment has paid off. The assessment has provided a scientific basis for the government's recent decision to invest on a new cleanup project in Maluan Bay, an area which faces similar problems to those experienced at the Yuan Dang Lagoon.

Cost-benefit of Yuan Dang Lagoon Cleanup



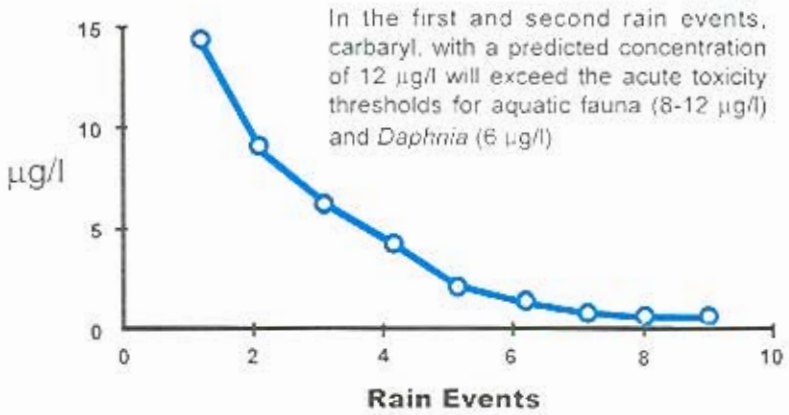
FAO Helps in Assessing Risk of Pesticides in Coastal Environments

In December 1996, a Memorandum of Agreement (MOA) was reached between the Regional Programme and the Food and Agriculture Organization (FAO) of the United Nations to assess the risk of pesticide use in both Batangas Bay and Xiamen demonstration sites. The study was conducted to aid agricultural waste management at the two sites and to transfer the risk assessment capacity to the local professionals.

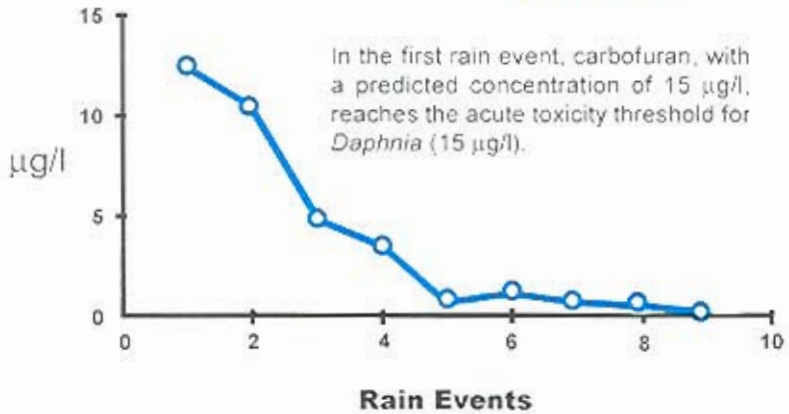
Three instruments were applied in the assessment: a) a scoring or ranking system, which basically derives indices of risk among a group of pesticides; b) the EQC (equilibrium criteria) model, which calculates partitioning, transport and transformation of pesticides in the environment; and c) the SOILFUG (soil fugacity) model, which is used to predict potential surface water contamination derived from pesticide use on agricultural lands.

Results in Batangas Bay indicated that pesticide use under current conditions represented relatively low risk to the marine environment. There were some signs that certain pesticides were appearing in marine waters, and should be considered an early warning. In Xiamen, the study noted the relatively high pesticide application rates on agricultural lands, and made specific recommendations for limiting/avoiding negative impacts in coastal waters, particularly in the vicinity of mariculture activities.

Predicted Environmental Concentration (PEC) of Carbaryl in Batangas Bay, Philippines



Predicted Environmental Concentration of Carbofuran in Xiamen Seas, China



> ***"The private sector's willingness to participate ... results, in part, from the fact that it has been given this window into the Philippine government. Through participation in the Council, private sector companies perceive they have an opportunity to shape government environmental policy. They also believe, as made evident by the Voluntary Agreements, that their involvement in the project will make their environmental management efforts easier and more cost effective. This is a hefty incentive for the private sector to get involved."***
>
> **Nicola Ross**
> **Global Environment Facility (GEF) Consultant**
> GEF Project lessons study: providing incentives
> 24 October 1997

Partnerships within and among the public and private sectors do not begin or end with financial investment. On the contrary, innovative mechanisms for partnership evolution have included policy, institutional and administrative initiatives which encourage the direct involvement of the private sector, universities, donors and investors, in partnership with central and local governments, in the management of marine pollution. Specific mechanisms which have been employed in 1997 include:

1. consensus building at the local and national levels for:

   a) strengthening waste management programs (i.e., Integrated Waste Management Action Plan for the Batangas Bay Region);

   b) meeting the obligations of international conventions (i.e., implementation of MARPOL 73/78 in the Philippines, Vietnam and Indonesia); and

   c) devolution of responsibility for marine pollution management from central to local government (the Philippines);

2. implementation of voluntary agreements between industry, the local municipalities, the Province of Batangas and central authorities to reduce waste generation and to set in place longer-term management capabilities;

3. multisectoral representation on ICM councils in Xiamen and Batangas Bay;

4. initiatives involving the Dutch Government, a Dutch consulting firm (WASTE) and local governments to promote waste recycling in Batangas Bay;

5. joint training programs in waste management (Batangas Bay) and oil spill response (Gulf of Thailand and southern South China Sea) involving representatives from the public and private sectors; and

6. cooperation and collaboration among scientists in three universities and national authorities of the littoral States of the Malacca Straits, to develop and test tools and instruments to enhance pollution risk assessment and management in the Straits.

Industry Benefits from Partnership

"The Batangas Bay project strategy was successful to get the commitment of companies, by giving them opportunity, through the Batangas Coastal Resources Management Foundation, to provide input in preparing the Environmental Master Plan of Batangas Bay....The Voluntary Agreements on waste reduction have been successful in generating concrete actions from the various signatories."

Mr. Tim Hake
BCRMF President and General Manager of Shell Refinery, Batangas
Batangas Bay Demonstration Project Evaluation Workshop
24-25 July 1997

In addition, a number of project activities were focused on exploring and assessing investment opportunities in, and benefit derived from, marine pollution prevention and management, for both the public and private sectors.

Some 12 major industries along Batangas Bay organized themselves into the Batangas Bay Coastal Resources Management Foundation (BCRMF) in 1991. The Foundation experienced ups and downs, in terms of its objectives and activities, during the initial years. However, its revitalization occurred in early 1996 when the ICM management framework and integrated waste management action plan were developed for the Batangas Bay Region. The BCRMF actively participated in these processes and became a member of the newly organized Batangas Bay Integrated Coastal Management Council. The Foundation has contributed to the overall ICM program in Batangas Bay through:

- public awareness campaigns;
- membership participation in voluntary agreements on waste reduction with the central and local governments;
- maintenance of oil spill equipment and conduct of spill response exercises; and
- participation in waste management audits and marine pollution monitoring programs.

Experience in Batangas has demonstrated that the private sector found its direction, role and functions within a well-defined ICM framework and waste management program. ICM practices facilitate balanced multiple resource uses, healthy functioning of market mechanisms and the sustainability of the resource base. These are compatible with long-term interests of the private sector and thus provide incentives for public-private sector partnerships.

Partnerships on Legal Aspects of Marine Pollution

There have been a number of partnerships established with universities and other institutions as part of the International Conventions component of the Regional Programme. The Asia Pacific Centre for Environmental Law (APCEL) of the Faculty of Law of the National University of Singapore collaborated with the Regional Programme in the production of the Legal Information Database. The Maritime Institute of Malaysia (MIMA) undertook the task of developing a regional guideline for national legislation on marine pollution. In the Philippines, the Department of Environment and Natural Resources has contributed extensively to the review and assessment of national legislation, and to the drafting of a model law on ICM.

Key Elements of Local Legislation on Integrated Coastal Management

Objective:

To consolidate and coordinate the efforts, services and resources of local government units in ICM.

Legislation Components:

Constitution of a coordinating mechanism/body. The creation or designation of a body (e.g., a Council) where each local government, national government agency, industry sector and other stakeholder groups in the area of coverage are represented, for the purpose of coordinating policies, programs and activities, and to serve as a forum for resolving inter-jurisdictional issues.

Integrated permit system. The integration of various permits that local or national authorities in the area of coverage are authorized to issue into one integrated system, to promote coordination and consultation and to minimize bureaucratic requirements.

Participation in the Integrated Environmental Impact Assessment process. For the EIA of projects to be undertaken within the area of coverage, the assumption of authority by the local government, to process certain project types or a mechanism for the local government to make an input into the national government's EIA process.

Monitoring and evaluation. Delineation of roles and coordination mechanisms.

Sustainable financing of activities, operations and programs, including:

- possible funding sources (appropriations from national and local budgets, taxation, fees and charges, market-based instruments, donations, etc.) and
- fund management (may include constitution of an environment fund).

Public participation by:

- non-government organizations/people's organizations
- industry
- general public

International Conventions: A Collaborative Quest

A MARPOL 73/78 initiative has produced successful partnerships with many entities in the region. APCEL was active in the organization of an introductory workshop on MARPOL, which brought together representatives of the four countries participating in the project, namely Cambodia, Indonesia, the Philippines and Vietnam. The Maritime and Port Authority (MPA) of Singapore has made invaluable contributions regarding its experience in the implementation of MARPOL, from which the other countries can learn. In Vietnam, the national action plan on MARPOL and CLC and FUND has begun implementation with the collaboration of the Vietnam-Canada Ocean and Coastal Cooperation Project (VCOP).

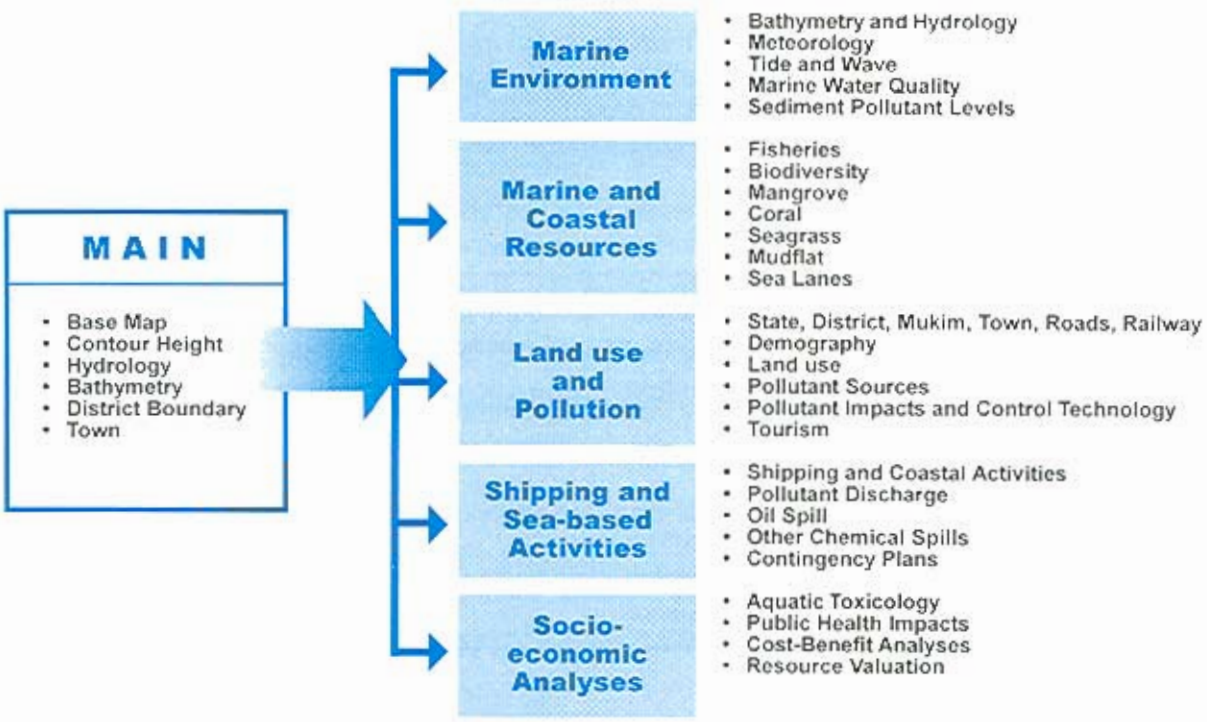
Scientists Mine the Malacca Straits Knowledge Base

There are many and varied sources of information on the Straits of Malacca, dealing with pollution monitoring, habitat research, fisheries exploitation, vessel traffic and so on. A lesson learned during the preparation of the Malacca Straits Environmental Profile was that, although data exist, they cannot always be accessed or, if accessible, are not available in a form that is useful to decision-makers. Thus, a comprehensive regional database and GIS for environmental management was seen as an essential component of the working model on risk assessment/risk management for the Straits.

To develop an effective regional knowledge base, cooperation among the concerned players was a fundamental requirement. Within Indonesia, Malaysia and Singapore, arrangements were established with government agencies, universities, scientific and technical institutions and the private sector to pool pertinent information on marine and coastal resources, pollutant sources and pollution monitoring, into respective national database systems and GIS. Once the national systems have been completed, they will be integrated into a regional database and GIS, which will be shared among the players in the three littoral States.

Scientists in universities in each of the countries took the lead in collecting, compiling, assessing and analyzing national data on the Straits, as well as incorporating the data into the agreed regional GIS format and structure. Government

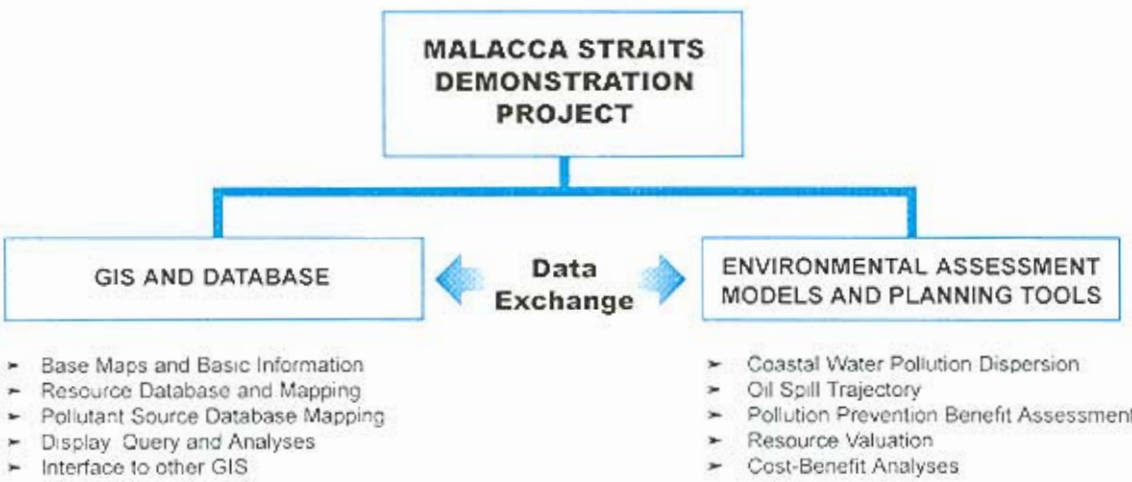
Structure of Regional Database and GIS



agencies supported the effort, providing access to maps, remote sensing data and related information and facilities at the central and local levels.

To ensure broad dissemination and use of the database and GIS, particularly as a management instrument for decision-makers, two features are being included in the packaging. An environmental atlas, in CD ROM format, will contain basic maps, thematic maps, information on human activities, distribution and economic value of coastal and marine resources and supporting information on the benefits and costs of marine pollution management options. For specific environmental assessment and planning functions, custom built software packages are being developed as submodules to the regional database and GIS. The functions include packages for assessing coastal and marine pollution arising from land- and sea-based activities, related risks, appropriate management and response scenarios and the associated costs and benefits derived from such interventions.

Environmental Management Atlas and Information System for the Malacca Straits



Investment Opportunities Developed

With the assistance of UNDP's Public-Private Partnerships for the Urban Environment, three main financing options are being mapped out under the Regional Programme. The routes may be broadly described as: *commercial ventures; public-private joint ventures; and publicly-funded projects*; with a variety of versions available under the public-private joint ventures option.

To develop investment opportunities involving public and private sector interests, the IMO signed a Memorandum of Agreement with the Philippine Ports Authority concerning the conduct of feasibility studies for Shore Reception Facilities and Related Services for Ship and Port Waste. The studies will focus on the technical and financial aspects of receiving, processing and disposing of vessel generated wastes (i.e., oily wastes and garbage) in six ports, namely: Batangas, Manila, Cebu, Iloilo, General Santos and Davao. The first study will be conducted on the Batangas-Manila ports, commencing in January 1998.

In parallel to the shore reception facility project, the Regional Programme, in collaboration with the Philippine Coast Guard, has implemented a study on requirements for bringing domestic vessels into compliance with the MARPOL 73/78 convention. An existing Philippine law requires domestic vessels to handle, store, treat and/or

dispose of oily waste, sewage and garbage in accordance with MARPOL 73/78 and its respective annexes. Domestic vessels are not able to comply with the law of the land because: a) they do not have the necessary on-board equipment; and b) there are no shore reception facilities in public ports to receive the wastes. The study, to be completed in January 1998, will identify the number and type of vessels out of compliance, the cost of bringing them into compliance, the economic impact on the shipping industry, and a proposed schedule for getting the 5,000 plus vessels fitted with appropriate equipment.

Two other feasibility studies were recently completed—one on agricultural waste management and one on municipal solid waste management—in the Batangas Bay Region. The studies have identified the sources, volumes and characteristics of the two wastes, current management practices and capacities, and the technical options available for improving the situation. Financial analyses of the most viable options were completed. Three consultative meetings were held with stakeholders in the Region in order to build consensus on the need for action.

It is apparent from these studies that an integrated approach is required for collection and management of waste. For example, 50% of the agricultural waste comes from "backyard" enterprises which have little capacity for proper processing and disposal of pig and poultry wastes.

Following the preparation of investment opportunity briefs for waste management, round table discussions with potential investors/lenders and national implementing agencies and regulators will be organized in the first quarter of 1998. The purpose of the round table will be to develop the foundation for a mixed ownership (public-private sector) company for management of wastes in Batangas Bay.

Signing of the Memorandum of Understanding between the Philippine Ports Authority (PPA) and the International Maritime Organization (IMO). From left: H.E. Simon Tensing De Cruz, Ambassador of Singapore; Mr. Carlos L. Agustin, General Manager, PPA; H.E. Fidel V. Ramos, President of the Republic of the Philippines; Dr. Chua Thia-Eng, Regional Programme Manager, IMO; Ms. Sarah Timpson, UNDP Resident Representative—Manila; Secretary Arturo Enrile, Department of Transportation and Communication; and Secretary Cesar Bautista, Department of Trade and Industry.

5. Beyond 1997

Although the project has made significant strides in meeting the overall objective of the Regional Programme, a number of targets remain to be achieved. Preparation of the Malacca Straits Environmental Atlas and the development of a public-private partnership in waste management in Batangas Bay are two key outputs planned for 1998. In addition, final reports on the ICM demonstration sites in Batangas Bay and Xiamen will be prepared, along with a number of related capacity building activities in ICM training, marine pollution monitoring, national legislation development and sustainable financing. Highlights of the 1998 work program are presented below.

Xiamen Demonstration Project

- environmental foundation establishment
- GIS package/management atlas preparation
- integrated waste management action plan completion
- marine pollution monitoring/evaluation
- final report of the Xiamen Demonstration Project
- ICM case study: Xiamen

Batangas Bay Demonstration Project

- industrial waste management appraisal
- fisheries/aquaculture evaluation
- ships' routing measures for Batangas Bay preparation
- marine pollution monitoring and assessment
- final report of the Batangas Bay Demonstration Project
- ICM case study: Batangas

Malacca Straits Demonstration Project

- regional database and GIS completion
- environmental atlas and information system
- refined risk assessment and risk management options
- packaging lessons learned in the Malacca Straits

Marine Pollution Monitoring

- directory of institutions
- network of ICM monitoring sites development
- analysis of pollution monitoring in the East Asian Seas

International Conventions

- guidelines on marine pollution legislation
- model legislation on management of coastal resources

Sustainable Financing

- project proposals for public-private partnerships
- investment opportunity briefs on waste management in Batangas Bay
- financial mechanisms for pollution management in subregional sea area
- round table of investors, lenders and donors
- manual on economic instruments

Capacity Building

- oil spill preparedness response and cooperation training for the Yellow Sea
- 4th regional training course on integrated coastal management
- regional integrated environmental impact assessment training workshop
- training on marine pollution monitoring techniques for Cambodia and Democratic People's Republic of Korea
- study tours to Batangas and Xiamen to learn from ICM demonstration sites' experiences
- training course on sampling
- training on marine pollution legislation
- internship program

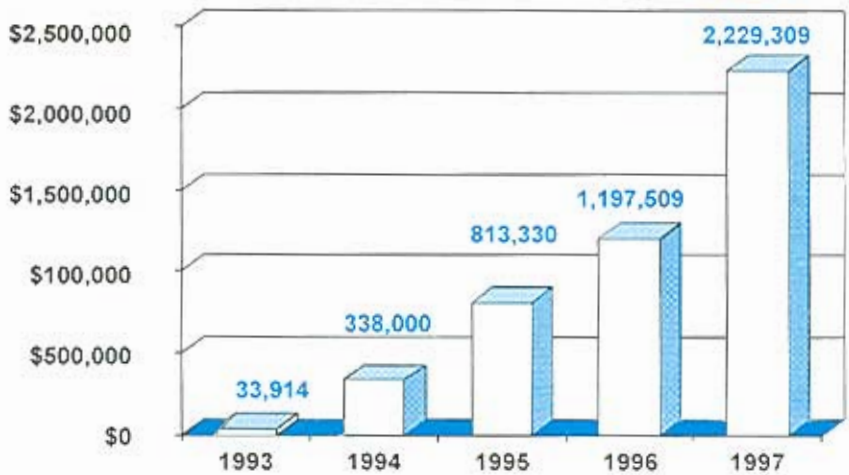
Enabling Activities

- oil spill modelling workshop
- policy conference on Malacca Straits
- workshop on marine pollution related conventions
- regional workshop on marine pollution monitoring and information management
- purchase of laboratory materials for Batangas Bay, Cambodia and DPR Korea
- workshop on national pollution legislation

6. Financial Commitments of the Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas

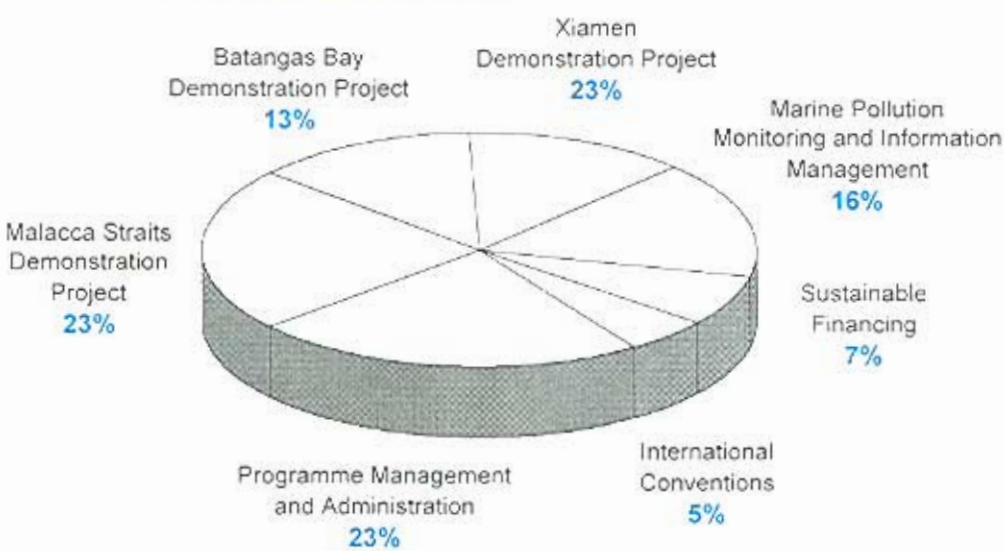
Programme expenditure for 1997, which is comprised of incurred costs plus financial commitments, was US$2.23 million. As of December 1997, the financial commitments and expenditures of the Regional Programme were 67.5% of the total budget allocation for the project.

a) Programme Expenditure, 1993 to 1997 in US Dollars
(excluding overhead allocation)



Twenty-three percent of expenditures for 1997 covered Programme management and administration costs, including salaries, travel, communications and Programme Office operation and supplies. The balance of the Programme expenditures were direct costs for project work and capacity building activities.

a) Operational Expenditure, 1997



Annex

MPP-EAS Technical Report Series

MPP-EAS Technical Report No. 1
The Regional Programme for Marine Pollution Prevention and Management in the East Asian Seas: Annual Report 1994-1995

MPP-EAS Technical Report No. 2
Enhancing the Success of Integrated Coastal Management: Good Practices in the Formulation, Design and Implementation of Integrated Coastal Management Initiatives (1996) (Available in Bahasa Indonesia, Chinese, French, Korean, Portuguese, Spanish, Swahili, Thai, Vietnamese)

MPP-EAS Technical Report No. 3
Strategic Environmental Management Plan for the Batangas Bay Region (1996)

MPP-EAS Technical Report No. 4
Lessons Learned from Successes and Failures of Integrated Coastal Management Initiatives (1996)

MPP-EAS Technical Report No. 5
The Coastal Environmental Profile of the Batangas Bay Region (1996)

MPP-EAS Technical Report No. 6
The Coastal Environmental Profile of the Xiamen Municipality (1996)

MPP-EAS Technical Report No. 7
The Strategic Management Plan for Marine Pollution Prevention and Management in Xiamen (1996)

MPP-EAS Technical Report No. 8
The Regional Programme for Marine Pollution Prevention and Management in the East Asian Seas: Annual Report (1996)

MPP-EAS Technical Report No. 9
Integrated Waste Management Action Plan for the Batangas Bay Region (1997)

MPP-EAS Technical Report No. 10
Malacca Straits Environmental Profile (1997)

MPP-EAS Technical Report No. 12
Manual of Practice: Contingent Valuation Survey for Integrated Coastal Management Applications (1997)

MPP-EAS Technical Report No. 13
Integrated Coastal Management (ICM) Contingent Valuation Survey in Batangas Bay, Philippines (1997)

MPP-EAS Technical Report No. 14
Environmental Atlas of the Batangas Bay Region (1997)

Workshop/Conference Proceedings

WORKSHOP PROCEEDINGS 1
Regional Network on the Legal Aspects of Marine Pollution (1996)

WORKSHOP PROCEEDINGS 2
Marine Pollution Monitoring and Information Management Network. Inception Workshop (1996)

WORKSHOP PROCEEDINGS 3
Proceedings of the IMO/APCEL/MPA Workshop on the Ratification and Implementation of MARPOL 73/78 in the East Asian Seas (1996)

WORKSHOP PROCEEDINGS 4
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