

Integrated Coastal Management in Tropical Developing Countries

Lessons Learned from Successes and Failures



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COASTAL RESOURCE CENTER

Edited by Chua Thia-Eng

Lessons Learned from Successes and Failures of Integrated Coastal Management Initiatives

Summary Proceedings of the International Workshop on
Integrated Coastal Management in Tropical Developing Countries:
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Xiamen, People's Republic of China
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GEF/UNDP/IMO Regional Programme for the Prevention and Management
of Marine Pollution in the East Asian Seas,
The Coastal Management Center,
Swedish International Development Cooperation Agency,
Danish Cooperation for Environment and Development, and
the State Oceanic Administration of the People's Republic of China

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Foreword

More than half of the world's population live within 60 km of the shoreline. Present trends in population growth indicate that this could increase by as much as 75% by the year 2020, with lives and aspirations for economic advancement inextricably linked to the productivity and utilization of coastal and marine resources.

Shallow tropical coastal areas have traditionally supported highly productive ecosystems from which fish and other aquatic resources are harvested. In addition to natural protective and defense functions against coastal erosion and flooding, these systems provide valuable services in terms of recreation, coastal tourism and marine transportation. In recent years, however, coastal and marine areas have been experiencing resource depletion and environmental degradation brought about by resource overexploitation, lack of clear policies and management actions, pollution from land-based and maritime activities, and rapid population growth.

To address such a broad range of social and environmental problems, and ultimately, to achieve sustainable development, integrated coastal management (ICM) is being widely promoted. In 1992, at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, the protection of coastal environments was at the top of the agenda for action. Under Agenda 21, coastal states are required to "commit themselves to integrated management and sustainable development of coastal areas and the marine environment under their national jurisdiction." UNCED further pointed out the importance of coastal states developing national policies and management capabilities for integrating the development and management of multisectoral activities in coastal and marine areas. To comply with these, many countries have initiated ICM programs. In addition, donor agencies have shifted their focus, giving priority to finance ICM activities.

ICM is a holistic planning, coordinating and management mechanism, designed to ensure that economic and social benefits from coastal resources are not dissipated by destructive practices or inappropriate use. Although the concept of ICM dates back several decades, its acceptance by most developing countries is fairly recent. Nevertheless, it is time for us to

reflect on what had been done right and what had been done wrong, both in developed and in developing countries. This will certainly enable us to make the necessary adjustments in our own ICM programs and enable us to reach the goal we seek—sustainable use of the coastal and marine resources—first in our own countries, then regionally, and finally, globally.

Despite the priority attention given to ICM, very little information on lessons learned from past experiences has been systematically compiled and analyzed. To help fill this information gap, the *International Workshop on Integrated Coastal Management in Tropical Developing Countries: Lessons Learned from Successes and Failures* was conducted. The workshop, held in Xiamen, People's Republic of China, from May 24-28, 1996, brought together many of the world's leading experts on ICM, some of whom are pioneers of the ICM concept; members of international organizations promoting ICM; and novice practitioners.

The workshop was organized by the Global Environment Facility/United Nations Development Programme/International Maritime Organization/Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas (GEF/UNDP/IMO/MPP-EAS), Coastal Management Center, and the Municipal Government of Xiamen. It was sponsored by the Swedish International Development Cooperation Agency, GEF/UNDP/IMO/MPP-EAS, the Coastal Resources Center of the University of Rhode Island (USA), the Danish Cooperation for Environment and Development (Denmark), and the State Oceanic Administration (China).

The objectives of the workshop are:

1. To bring together practitioners in coastal management to share their experiences, methods, and approaches in initiating, formulating, and implementing ICM programs;
2. To distill from the discussions, lessons learned from past successes and failures; and
3. To formulate basic principles and guidelines for future endeavors in ICM, particularly in developing countries.

This publication contains the summary of the working sessions. More importantly, it contains the report of the main findings of the workshop, that is, "Enhancing the Success of Integrated Coastal Management: Good Practices for the Formulation, Design and Implementation of Integrated Coastal Management," based on the contributions of the participants. The workshop papers are being reviewed and edited for publication in the *Journal of Ocean and Coastal Management*.

Deborah M. Villa and Nancy A. Bermas have significantly contributed many of the technical and editorial inputs into this document, particularly in extracting key information as well as preparing summaries of relevant technical papers that have been presented at the Xiamen ICM Workshop. A number of staff members from the Coastal Management Center and IMO contributed to the publication of this document. They include Dr. Ranjith de Silva, Mr. James Paw, Mr. Jaime Ronquillo and Mr. Jonel Dulay. Dr. Chou Loke Ming of the National University of Singapore and Dr. Liana T. McManus of the University of the Philippines in Diliman reviewed the manuscript.

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Summary of the Welcome Remarks

The workshop opened with representatives from the State Oceanic Administration (SOA), International Maritime Organization (IMO), United Nations Development Programme (UNDP), and the Municipal Government of Xiamen, welcoming the participants and guests.

Mr. Chen Bingxin, SOA's Deputy Administrator, focused his address on the role his agency plays on the prevention and management of marine pollution. He emphasized the commitment of the Chinese Government to undertake multifaceted environmental programs of which the Xiamen demonstration project is an example. This demonstration project has been implemented successfully due to the strong support of the Xiamen Municipal Government, involving over 20 different administrative departments with the aim to be a "success model" for other ICM programs.

Dr. Chua Thia-Eng, the Regional Programme Manager of the GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas, emphasized the importance of the workshop in relation to past and future ICM endeavors. He stated that, although ICM has been discussed quite extensively in the past, basic ICM principles and guidelines conceived from successes or failures have yet to be fully developed. The convergence of ICM experts from all over the world to attend the workshop signifies that the time has come to address this issue. Dr. Chua ended with a word of thanks to the Municipal Government of Xiamen and sponsoring agencies for making the workshop possible.

Mr. Arthur Holcombe, Resident Representative of UNDP in China, delivered his welcome remarks on behalf of the donor agencies. He stressed the need for a viable ICM system to suit local situations and conditions. He also stated the need for strong political will and commitment on the part of the governments. Mr. Holcombe commended the support of other donor agencies in taking an active part in the realization of the workshop.

Finally, the Honorable Zhu Yayen, First Vice-Mayor of Xiamen, welcomed the participants and guests on behalf of the Municipal Government. Mr. Zhu declared that Xiamen's economic development is among the top ten of the cities of China. Cognizant of the fact that

development usually brings about resource-use problems and environmental degradation, the Xiamen Municipal Government is undertaking measures to address the issues using the ICM approach. This has undoubtedly promoted improvements in marine and coastal management. Mr. Zhu pointed out that due to the strong political will and commitment on the part of the Xiamen Municipal Government to undertake the ICM program, municipality's resources were mobilized to complement UNDP/IMO inputs. Mr. Zhu ended his address with the hope that Xiamen would benefit from the workshop output.

Summary of the Closing Remarks

The workshop ended with representatives from the Xiamen Municipal Government, IMO, and the two major funding agencies, Sida and DANCED, thanking the participants for their active participation and contribution to the success of the workshop.

Mr. Yang Pen Shi, Deputy Director General of the General Office of the Xiamen Municipal Government, speaking on behalf of the Municipal Government of Xiamen, extended his warmest congratulations to the success of the workshop. He gave assurance that the Municipal Government would take into account the lessons learned in ICM program implementation shared by the participants from other countries. The strong support and commitment of the national government is an indication of the government's interest to seriously consider applying ICM in its coastal programs.

Dr. Chua Thia-Eng of IMO congratulated everyone for a job well done. He thanked the participants for their active participation, members of the Organizing Committee for ensuring that the workshop activities proceeded smoothly, sponsoring agencies for their funding support, and the Municipal Government of Xiamen for hosting the workshop. Dr. Chua informed the body that the output of the workshop would be made available to interested persons, concerned institutions and governments.

Dr. Kirsten Worm, representing DANCED, expressed her gratitude for the invitation to the workshop and the opportunity to share Denmark's experiences in ICM. She highlighted DANCED's role in environmental assistance, particularly in developing countries like Thailand, Malaysia, and South Africa. She specifically touched on DANCED's priorities of which ICM is a target area. Dr. Worm was optimistic that cooperation between DANCED and other donor agencies, as well as with public authorities, private companies, and non-governmental organizations would strengthen international efforts towards sustainable development in the coastal areas.

Dr. Anders Granlund, the representative from Sida, shared his views on the limiting factors in the sustainable management of the coastal zone. With the successful conclusion of the workshop, he felt that majority of the limiting factors he enumerated were well addressed. On behalf of the

Research Department of Sida, Dr. Granlund pledged its continued support, particularly to developing countries. Finally, he thanked the Organizing Committee, the Municipal Government of Xiamen, and other sponsoring agencies for making the workshop successful.

Summary of the Keynote Address

Dr. Jens Sorensen presented his keynote address as an overview of what were achieved and what lessons were learned from national and international efforts in ICM. Considerable achievements *have* been made as evidenced by the increasing number of ICM efforts around the world. For instance, a rise from 108 efforts in 44 coastal states in 1992 to 140 in 56 coastal countries in 1993 has been documented. Also, there has been a significant increase in ICM information outputs and exchange of international experience through publications, cybernet sites, international conferences/meetings, education and training programs, production of guidelines, and development of working models.

Through his deliberation, Dr. Sorensen stressed that the willingness of government units to fund ICM programs is one important measure of success. He further outlined the importance of capacity building in response to the recent global proliferation of ICM efforts requiring trained personnel with knowledge, and technical and managerial skills to formulate and implement ICM programs.

Twenty-nine important lessons learned from past ICM initiatives were discussed. The common challenges inherent to the process of integrated environmental planning and management include: designing a program that can fit with the legal system and social customs; horizontal and vertical integration; governance arrangement and selection of lead agency; stakeholder participation including community-based planning and management; public education and building a supportive constituency; opposition by stakeholders affected by program implementation; coping with political manipulation; understanding the dynamics of the coastal physical system and their interactions with other systems; establishing the regulatory and the planning boundaries; dialogue and mutual understanding between the policy-makers and scientific communities; procuring technical expertise to design and implement policy; training and education of ICM practitioners; information management; budget constraints and the overextension of fiscal resources; assessing non-monetary or not easily quantifiable costs and benefits; and program monitoring and evaluation.

Dr. Sorensen expounded on the issues that led to the successes or failures in ICM and suggested means to overcome impediments. The issues on program implementation and evaluation were repeatedly emphasized and the need to provide an appropriate ICM framework and determine output indicators were also highlighted. *(These issues are further addressed in Session II wherein emphasis is placed on the determination and refinement of success criteria and the development of a generic framework for monitoring ICM programs - eds.)*

In response to Agenda 21's call for ICM to be supported by the international community, Dr. Sorensen concluded his address by presenting recommendations for an international agenda for the coasts. It outlined topics ranging from socioeconomic aspects, environmental degradation, common methods and management techniques, guidelines for planning and management, and information management.

Summary of the Working Sessions

Lessons Learned From Case Studies

Twelve case studies from Asia, America, Australia, Africa and Europe covering the management of a wide range of coastal systems in diversified political, cultural and socioeconomic conditions were the focus of this session. The paper presentations and lively discussion that followed centered on distilling relevant lessons from the formulation of integrated coastal management (ICM) programs and their subsequent implementation. The main points of the session are summarized and presented under each subheading below.

ICM Initiatives at the Local and National Levels

Local Government and Community Involvement

Community and local government involvement are identified by participants as important components of ICM. Three of the following case studies presented in this session established that the success of coastal management lies in the involvement of the community and local government in the planning and management activity (*see also Session III*).

Dr. Jayampathy Samarakoon affirmed that the elements for success in ICM are community empowerment, conflict resolution and integration by way of dialogues. Dr. Liana McManus stressed the need for stronger local government involvement together with a strong partnership forged with the local communities. Both Dr. Angel Alcala and Mr. Alfredo Isidro stated that this is because local efforts are considered more effective than some national governments which are traditionally weak in implementation. The partnership will also ensure the continuity and success of the ICM program during the transition of local political authority. They maintained that this involvement can be manifested through simple demonstrations of ecological relationships and economic benefits to the local communities. However, as experienced in the Philippines, community-based resource management is usually dependent on external funding sources for implementation, with some support from government such as policing. Dependency may lead to questions on continuity of ICM efforts after the end of the program or project.

In his paper, Dr. Wong Poh Poh highlighted community involvement in coastal resources planning and management in relation to tourism development. The different types of coastal tourism experienced in East Asia suggest that in the planning and management stages of the development, coastal communities must be considered because they will be directly affected by the activity.

Dr. Wong also stressed that the negative impacts of tourism must be taken into account and that each potential destination area be carefully assessed prior to development (*see also Session III*). Community involvement in the development of the industry is considered especially important in the ASEAN region because tourism is a major component of their economies.

One lesson learned here is that a successful ICM program must include the local government and local community, whose active participation ensures the attainment of management objectives.

Capacity Building

Enhancing the technical capacity of local governments and increasing community exposure to environmental matters and processes through training and education are other identified components of ICM (*see also Session III and Session V*). As expressed by Dr. McManus, and supported by the majority of participants, capacity building must occur during the initial stage of the ICM program. For instance, she stated that the low priority level of capacity building in the Lingayen Gulf project was a limiting factor in the management of the Gulf.

Institutional Arrangements and Government Policy

Numerous studies demonstrate that the failures in adequately addressing environmental problems are partly attributed to deficiencies in agencies with mandates on resource governance and environmental management. Weak institutional arrangements or lack of sound government policies related to coastal areas are common impediments to the successful implementation of ICM programs. This was substantiated by the presentation of papers from the Philippines, Taiwan and China, identifying it as a major constraint.

Dr. McManus stated that changes in local political leadership with high turnover rates did not ensure the continuity of strategic core programs. She recommended that a permanent budget line and personnel be in place.

Both Dr. Chiau Wen Yan and Mr. Tian Hongguo affirmed that sectoral management frequently results in intersectoral conflicts. Sectoral management is usually visible by the lack of coordination among agencies, ambiguous implementing responsibilities and the general lack of unified laws and policies in the national and local governments. Consequently, intersectoral conflict resulting from the above signs of institutional weaknesses will occur. Dr. Chiau also identified limited channels for the involvement or participation of coastal inhabitants as an impediment in the ICM process.

Attempts to strengthen institutional arrangements in the three areas can be accomplished by establishing an institutional mechanism such as an interagency commission or committee.¹ The function of this organization is to coordinate and manage the coastal area and to draw support from local and national legislation. While the institutional and legal aspects require the coordination between national and local governments (in effect, requiring more time), capacity building is recommended to be undertaken as soon as possible.

In their paper, Drs. Chua Thia-Eng, Huming Yu and Mr. Chen Guoqiang recommended the establishment of sustainable financing mechanisms and the adoption of consultation and consensus building efforts among stakeholders in resolving use conflicts. As such, scientific investigations should be used to guide and address management issues (see also Session IV). Finally, it is recommended that program formulation be limited in time frame so that modifications can be integrated into the planning for implementation.

Cooperation and Negotiation with National and Regional Authorities

Successful cooperation and coordination through negotiations between local governments, communities, and national and regional authorities in ICM are illustrated in the following examples. Customarily,

¹ However, as is later discussed in Session III, it was felt that existing agencies should retain their line functions, with integration achieved through the ICM framework.

national authorities enact legislation to balance economic development and environmental conservation, whereas local governments implement these legislations and determine those that work, those which do not and why. Dr. Kirsten Worm admitted that results of negotiations and compromises between national and local governments do not always produce optimal solutions to the many use conflicts. However, the consultation process within the framework of ICM may contribute to their partial solutions.

Drs. Richard Kenchington and Worm acknowledged that the general success of coastal zone management is due to the strength of participation of local authorities and an institutional-oriented capacity building process. This is achieved by direct community or public participation and a high level of environmental awareness regarding conservation issues. Dr. Kenchington stressed that maintaining effective management requires long-term effort and community support at time scales set to 10 years. This figure has been estimated to offset the changing physical and socioeconomic conditions; such that, these conditions, together with new knowledge and new sets of environmental pressures, will result in a new set of management strategies.

ICM Initiatives at the Regional Level

Very few ICM initiatives at the regional level exist. More often than not, ICM initiatives occur at the local level. However, one such regional initiative was established in the cooperative East African Coastal Region² in the signing of the Arusha Resolution.³ As illustrated by Dr. Magnus Ngoile, activities include the establishment of dialogues between various government agencies and stakeholders and the participation of the scientific community in conducting a multi- and inter-disciplinary study. Within a span of three years, the identification of a country (in this case, Tanzania) was done to coordinate intercessional initiatives within the region.

Cooperation between nations within the region has brought about an increase in national workshops, bringing together national experts and

² This regional initiative covers the following countries in the Western Indian Ocean, Comoros, Kenya, Madagascar, Mauritius, Mozambique, Reunion, and Tanzania.

³ The Arusha Resolution is a policy statement calling upon the states of Eastern Africa to give emphasis to sustainable development and integrated management of coastal areas for the primary benefit of coastal communities.

decision makers from different sectors to discuss coastal management issues and new strategies in improving the implementation of the ICM initiative. It has also resulted in a regional framework for incorporating national ICM efforts.

The concept of a regional ICM initiative brought up questions on geographic scale during the lively discussion that followed. Regional ICM could be useful as basis for regional policy meetings to address transboundary issues such as marine pollution and migratory fish stocks. Regional ICM is also useful in promoting regional monitoring and the sharing of experiences and results of national ICM efforts. Both the ASEAN/US Coastal Resources Management initiatives and that of the Wadden Sea are other examples of successful regional ICM initiatives.

ICM Initiatives at the Global Level

Should efforts be made to develop a standard ICM model for global application? In her paper, Dr. Biliana Cicin-Sain presented a global survey showing that systematic comparisons of ICM processes in different countries based on case studies are not reliable because each study uses different variables and addresses different questions (*see also Sessions II and III*). For these reasons, when conducting global comparisons, differences in ICM perceptions, approaches and processes existing between developed, middle-developing and developing countries must be considered.

The survey showed that ICM nomenclature has been applied differently in different countries. However, in general, the *process* is being followed to develop environmental management plans at the local levels to fit into a larger ICM program at the national and regional levels.

During the discussion, questions on best practices for ICM formulation, design and implementation were brought up (*See also workshop outputs on good practices, Annex 1*). Because ICM is a human intervention process, it was suggested that the focus of ICM be on managing human activities and not on natural processes alone. Overemphasis in planning without ample consideration to implementation may jeopardize the success of a program. For instance, ICM planning should avoid the problem presented by land use planning in which people perceive the plan as a fixed one, that is, as one that cannot be changed over time. It was suggested that ICM

is, as one that cannot be changed over time. It was suggested that ICM planning be based on a “systems management” approach and perceived as a cyclical process evolving with time.

Also, during the discussion, a suggestion was made to have a general ICM framework which could be applied to address different issues, such as marine pollution, fisheries, aquaculture and biodiversity. The discussion then centered around the possibility of developing generic guidelines with built-in flexibility to permit application in different country settings, as global standardization of ICM guidelines might not be practical.

At present, there is not yet one model of ICM for success. This is because ICM is a socioeconomic driven approach, to be adapted in different situations with different variables.

Indicators of Success

Comprehensive evaluation in ICM is a process that uses the knowledge and insights of the pure and applied sciences to determine the causal relationships between management actions and outcomes of these actions on the dynamic and complex natural environment. Its primary objective is to generate insights into the implementation of an ICM program.

When conducting comprehensive evaluation, it is important to specify the expected or desired outcomes of the program through the development of evaluation criteria. Evaluation criteria can be in the form of a desired process or an expected output from specific, or a combination of, management interventions. These desired outcomes or products should serve as reasonably precise management endpoints that will enable managers and the general public to gauge the overall success of an ICM program.

In the past, few comprehensive evaluations have been performed for ICM programs. This is due to the difficulty of the process with regards to the reliance on qualitative perception, accuracy of baseline information and causal-relationship uncertainties. The objectives of this session were to determine and refine success criteria and to develop a generic framework for monitoring ICM programs. Complementing each other, the following two papers provided: (1) an initial framework to determine the level of success of the ICM initiative, and (2) a discussion on a common methodology in identifying indicators of success.

Framework for Evaluation

Dr. Peter Burbridge presented a framework for measuring the success of ICM initiatives. A distinction is first made in measuring *progress* in developing ICM programs and projects by having clear and unambiguous standards and methods of assessment, and *success* of such initiatives in meeting clear and unambiguous development goals and objectives.

He outlined some elements of good practices under three major components, namely, the socio-cultural, economic and biogeophysical

realms. Elements in the socio-cultural realm must consider a number of relevant community development issues with regard to sustainable resource use. Some issues to consider include: traditional management practices, population growth resulting in competing resource use, conflict resolution practices, changing patterns of acceptable behavior with regard to use in maintaining food supplies and incomes, uncertainties regarding the natural resource base, and, activities that contribute to the degradation of existing resources.

Elements in the economic realm must include a full account of both the economic and the environmental goods and services generated by coastal ecosystems. In relation to this, Dr. Burbridge cited a study which estimates the economic costs associated with meeting environmental quality standards and measuring the trade-offs between economic and environmental goals.

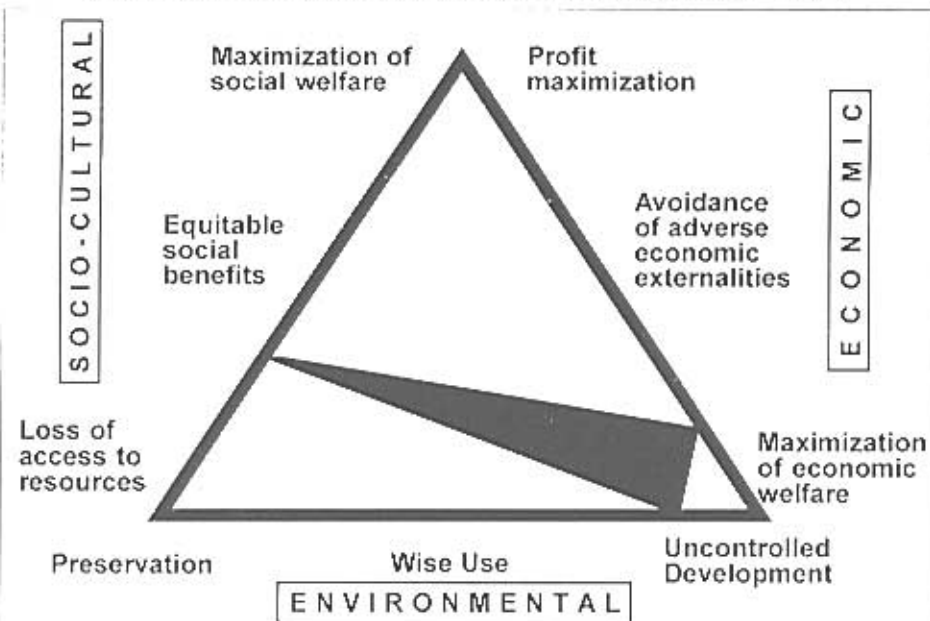
The biogeophysical realm includes the overall issue on how to achieve sustainable use of renewable natural resources in the coastal zone. Strengthening political will is considered mandatory to improve the process of planning and management of ICM. Thus, elements of this realm include improved communication between scientists and policy makers regarding the ecological, economic and social significance of coastal resources.

With the assumption that the sustainability of development in coastal environments is based on the interrelationships between the socio-cultural, economic and biogeophysical issues and realms, Dr. Burbridge illustrated his framework (Figure 1) in measuring progress using an incremental ten-point scale at each side of a triangle. Each point represents the level of achievement in developing an ICM program. Connecting the points on each side of the triangle results in the formation of a second triangle (shaded) in which size and shape represent the level of success of the ICM initiative in meeting stated objectives. It also suggests the social and economic trade-offs incurred.

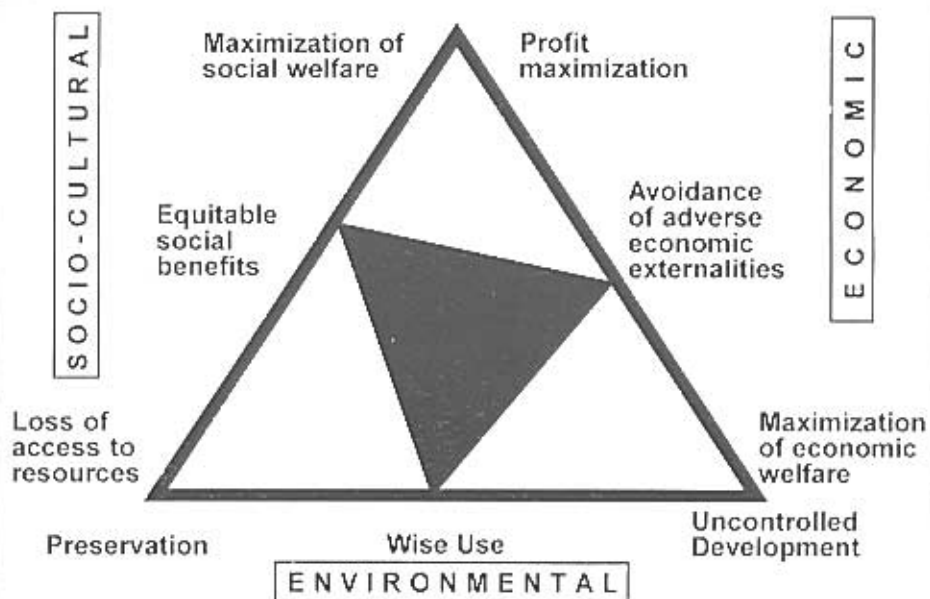
Common Methodology for Evaluation

In his paper, Dr. Stephen Olsen stated that standard methodologies and indicators are necessary for learning from the ICM experience. However, a common problem in conducting comparative international

Figure 1
 Framework to Measure Level of Success of ICM Initiative



A



B

The shaded portion of A suggests major social and economic trade-offs and the emphasis given to coastal management is small, whereas, B illustrates a situation where strong emphasis is given to conservation of coastal ecosystems and wise use of renewable resources, promoting equitable economic development and avoiding adverse environmental effects.

evaluation is the differing methodologies and indicators used in each of the evaluations. Dr. Olsen stated that it is essential that the common methodology addresses (1) the governance process itself, (2) progress towards specific social and environmental qualities in which ICM programs are attempting to attain, and (3) the pressures affecting those qualities. Such a methodology must be kept simple and must build upon existing evaluative experiences and tools. During the discussion, a reminder was given regarding well developed procedures in other fields of development that can be adopted and used in coastal management projects.

The establishment of a checklist of appropriate indicators for the different ICM project components, e.g., fishery, water quality, coastal erosion, etc., was proposed during the discussion. This led to a consensus that the development of baseline data and standards for each indicator for comparative purposes, either locally or globally, is necessary (*see also Session IV*). Examples are the standards established by the World Health Organization on health and water quality.

In his keynote address, Dr. Sorensen stated that ideally, evaluations are conducted by institutions or persons who are not directly connected to the program being investigated. In this way, the problem of bias is prevented as these teams are expected to provide objective evaluation of coastal management schemes. A suggestion to professionalize coastal management within the next few years was likewise made.

Another point stressed in Dr. Olsen's paper is that ICM takes decades to implement. As discussed by Dr. Kenchington in the previous session, Dr. Olsen stated that successful ICM projects must be designed in recognition of this time-element if they are to have reasonable prospects of progressing through the sequence of outcomes such as sustainable environmental quality and quality of life. One of the keys to success will be to conduct the requisite learning in the right areas so as to anticipate emerging management needs.

It was clear in the discussion that support by government at the local and higher levels is regarded as essential in ensuring the success of coastal management projects. However, it was pointed out that politicians

tend to go for short-term projects that yield quick results within their term of office (*see also Sessions III and VII*). Thus, it is important to raise politicians' awareness by associating the success of coastal management projects to long term success in economic development. The possible use of the environmental elasticity measure relating the variability of environmental quality to economic growth was also discussed.

In conclusion, a consensus was garnered that although difficult, a common ICM framework and methodology must be established for international application. This will then present basis for conducting comparative evaluations. Comparative evaluations of different ICM initiatives would subsequently result in greater efficiency in ICM implementation.

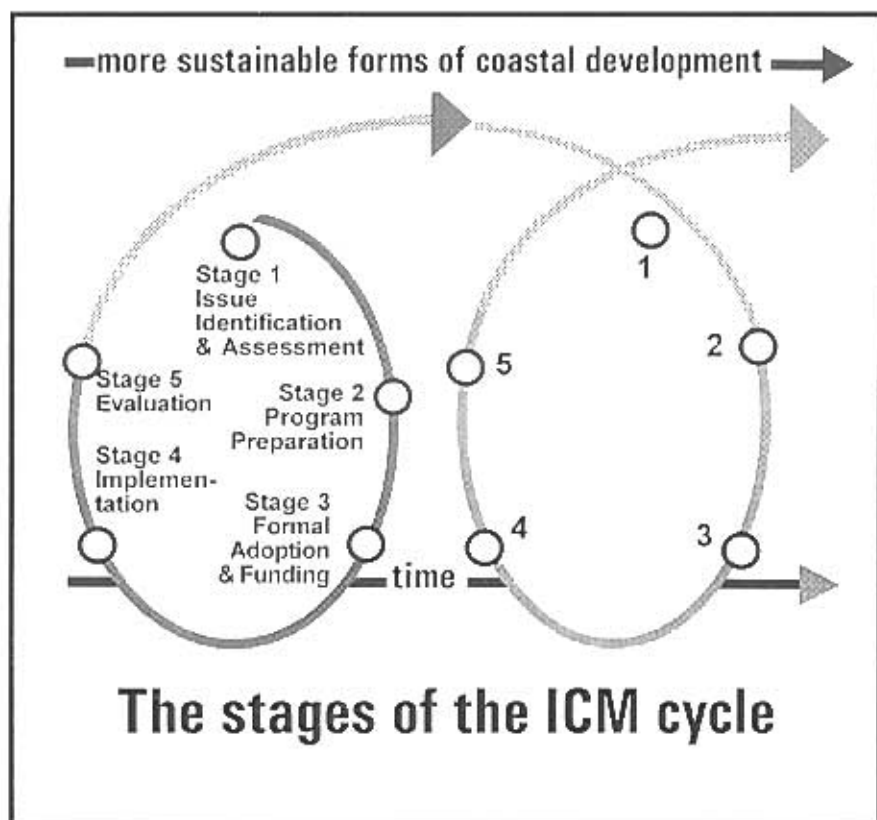
The development of the framework and indices for evaluating the success of ICM programs was welcomed by a UNDP representative. He stated that these frameworks and indices could contribute significantly to UNDP's efforts to develop and use indicators of sustainable human development.

Program Initiation, Formulation, Implementation, Monitoring and Evaluation

There has been a proliferation of ICM efforts and initiatives in all parts of the world, ranging from the management of single resource systems, such as coral reefs, to a varied number of interacting resource systems in larger marine environments. Each ICM initiative goes through the four stages of the ICM cycle, namely, program initiation, program formulation, program implementation, and monitoring and evaluation.

Dr. Olsen presented the different stages of the ICM cycle as shown in the figure below (Figure 2).

Figure 2
Stages of the ICM Cycle



ICM is a dynamic process because, as stated in the previous section, management modifications will always be adopted in response to particular and changing needs, diversity and nature of management issues and the socio-political and environmental characteristics of the target sites. The figure above shows this dynamic nature of ICM which will require feedback among the stages and may also alter sequences; or will require the repetition of some stages.

The paper presentations and discussions that followed focused on the relevant lessons learned from the different stages of the ICM program.

Program Initiation and Formulation

Program Initiation

Program initiation takes place when there is an awareness of the need for environmental protection. This awareness may arise from serious issues such as resource over-exploitation, environmental degradation, and resource-use conflicts.

The three papers discussed the need for ICM to be implemented in the coastal areas of Thailand, China and Indonesia. In Thailand, conflicting use is experienced between the tourism industry and the inshore fishing community. Because of the continuous emission of untreated waste water from tourism activities, the inshore environment became polluted, causing a decline in fisheries productivity, reduced fish catch, and consequently, reduced income for the already marginalized fishermen.

Conflicting use of coastal resources was also illustrated in the papers by Prof. Ying Wang and Dr. Rokhmin Dahuri on the tidal flats of China and the coastal lowlands of Indonesia, respectively. Tidal flats in China are considered both economically and ecologically important. However, they are threatened by the growing population which has substantially converted tidal flats to agriculture. The authors stressed the need for the integration and coordination of the various sectors through a single line agency or coordinating agency responsible for coastal environment and resources to reduce such conflicting uses.

Program Formulation

Papers highlighted major elements that are essential in ICM program formulation. These include the involvement of all stakeholders, an issue-driven approach, a governance arrangement, selection of a lead agency, the integration and coordination of different levels of government agencies, and program conformity with the existing legal system and social customs.

Involvement of Stakeholders

ICM program formulation will require the involvement and coordination of all levels (local, state and national) of government and communities, particularly when national or regional governments have insufficient resources to implement, enforce and monitor compliance with regulations and guidelines. This has been successfully illustrated in Kenya with Dr. Ezekiel Okemwa maintaining that the formation of a multi-sectoral coordinating team will bring about the identification of demonstration activities and will collectively address some of the major management problems in the area.

Authors affirmed that stakeholders involvement will also help in the following: resolve jurisdictional conflicts, maximize coordination and the sharing of resources, minimize duplication of efforts, and resolve other problems not being effectively addressed.

ICM Programs are Issue Driven

Dr. Ranjith De Silva expressed that an effective ICM program should be built around existing issues and problems which are identified through a participatory process. The issues will serve as the basis for the formulation of the program. The issue-driven program will facilitate the following: the identification of goals and objectives; determination of stakeholders, information and research needs, and institutional arrangements; and, the development of monitoring and evaluation protocol.

However, Dr. Chua cautioned that one must not put too much focus on just the identification of issues and problems, rather, focus should also be placed on resolving management issues which include sustainable development and improvement of the target area.

Clear Goals and Objectives

It is important to formulate clear and unambiguous goals and objectives. Dr. Jihyun Lee stated that the identification of priority problems is critical in setting management priorities, followed by the determination of definite goals and objectives. This determination of goals and objectives will establish a consensus on the direction the program should take, provide the framework for integration and coordination, and provide the criteria for program monitoring and evaluation.

Establishment of a Governance Arrangement

To facilitate the implementation of an ICM program, the government's existing procedure of policy and decision making must be assessed during program formulation. A quick assessment of the existing environmental and resource management related laws and regulations, specifically those related to the ICM program (such as the requirement of an environmental impact assessment, land use planning, water quality monitoring, and protected areas), must be made. The majority of the presenting authors stated that the integration of ICM initiatives into existing government programs will help in the formulation and implementation of the ICM program. For instance, Mr. Li Ye stated that focusing on the existing land use plan and marine environmental management plan will expedite the smooth formulation of the ICM program in Xiamen.

Establishment of a Lead Agency for Integration and Coordination

Integration and coordination between the different sectors, national and local government agencies, and other stakeholders for the proper management of the coastal environment are the essence of ICM programs. In this light, Dr. Chua maintained that the collaboration between institutions, requires the coordination and integration of efforts in order to effectively address multi-sectoral and multi-user issues (*see also Session I*). He also emphasized the need of involving both national and local agencies which have planning, regulatory and enforcement functions, from the inception phase to the monitoring and evaluation phase.

Dr. Sorensen stated that the selection of a lead government agency usually depends on the focus of the issue. Dr. Lee, however, indicated that the choice of the lead agency may not always be optimal due to lack of interest or motivation in the organization. Strategies to stimulate participation of lead agencies and stakeholders such as the holding of technical seminars and workshops on issues of the coastal zone, the publication of newsletters and brochures, and the holding of regular meetings with the different stakeholders, may be necessary.

Parallel to this, Dr. Chua stressed the importance of the lead agency having the appropriate mandate, and even more important, the *capacity* to effectively coordinate ICM program formulation and its implementation (*see also Session V*).

Designing an ICM Program

Scope

Generally, initial ICM programs (or the first generation of ICM programs) are limited in resources and time to cover a wide area of influence. For this reason, program designers may have to narrow the scope of the ICM initiative. This may be done in the following two ways:

Limiting the Number of Issues. Dr. Lee believed that focusing on too many different issues or treating all of the issues as if they are of equal importance makes it very easy to lose what should be the focus of the ICM program. She recommended that to build confidence and understanding in the political, economic and social environments, the program may first have to demonstrate some solid progress in a reasonably short time. Limiting the number of issues and their resolution have been proven to build this confidence.

Preparing ICM Plans for a Few Segments of the Coastal Zone or Narrow Zone of Influence. Both Dr. John Clark and Mr. Solomon Jusuf Makoloweka stated that working in relatively manageable areas or small “pilot” areas will facilitate the success of ICM program implementation. This may subsequently bring about the implementation of the ICM program in a regional or national level. The strategy of using a narrow spatial zone of

influence is considered useful in accelerating the learning process, particularly in countries having limited success in implementing resource management initiatives (see also Dr. Clark's discussion in Session VII).

Hypotheses

In his keynote address, Dr. Sorensen stated that the hypotheses underlying the design of the program should be clearly stated. The output (process) and outcome indicators should be identified at the outset and used to objectively assess the progress, or lack of it, and test the validity of the hypotheses. When hypotheses must be discarded or modified, this should be overtly recognized and the reasons for such conclusions be made explicitly. This will facilitate a comprehensive evaluation of the ICM methodology (see also Session II).

Training

A need to train formulators and implementors of ICM programs in order that they can adequately plan and manage coastal systems, resources and environments was identified (see also human resources development, Session V). It was generally agreed that capacity building be given priority in ICM program development, especially to officials at the local government level.

Dr. Chua highlighted that on-the-job training can be facilitated during the formulation and execution of the management plans, as was experienced in the ASEAN/US Coastal Resources Management Project.

Environmental Profile

Producing an environmental profile is necessary to understand the relationships among the different components of the existing environment which will lead to the proper identification and prioritization of management issues. The profile will include the compilation and analysis of secondary information, reconnaissance surveys and interviews. There was a consensus among the presenters and participants that the availability of data and the early completion of the coastal environmental profile will quickly identify data gaps as well as management issues in the coastal zone.

Program Implementation and Evaluation

Program Implementation

Institutionalizing ICM and the involvement of stakeholders are two important aspects discussed in relation to the implementation of the ICM program.

Institutionalizing ICM

Sectoral to Integrated Management. The paper of Drs. Chua and Yu and Mr. Chen stated that the task of integrating and coordinating sectoral management activities is a difficult one. Presenters affirmed that initial activities to effect a change in management must be directed from the existing sectoral management system to one that encourages the application of the ICM system. However, these efforts, such as the modification of existing coastal legislation, is contended to be a long and arduous endeavor. Based on the experience in Xiamen, acceptance to new legislation will only take place after deliberations and continued public awareness activities are undertaken.

Education and Awareness. Education and continued exposure can help politicians increase their own awareness in environmental issues and concerns. Readiness to accept and use ICM as a management strategy for sustainable development will then follow.

The fact that ICM generates business opportunities needs to be highlighted throughout the educational process to gain political support and to deepen social acceptance. Positive socioeconomic benefits as a result of sustaining natural resource bases can facilitate communication with politicians whose agenda are usually driven by the economic interests of their constituencies.

Creating a New Institutional Body. There was a general agreement that it is better to avoid the establishment of a new institutional body as being a time-consuming activity, needing appropriate manpower and financial resources, and could even be misinterpreted as a threat by existing agencies. It would be far better for existing agencies to retain their line functions, with functional integration to be achieved through the ICM framework.

Time Frame. It was felt that the time needed to institute a viable ICM program takes too long and entails too many human and financial resources. However, in institutionalizing ICM programs, implementors must recognize the temporal scales that natural systems require to recover from the effects of unmanaged or mismanaged human use.

Mechanisms for Community Involvement

While government adoption is considered necessary, it will have to mobilize its partners in the local community in order to effectively implement an ICM program. Institutions and mechanisms at the local community level are considered crucial because they provide the means through which community participation in decision making and implementation processes are manifested (*see also Session I*). For instance, local participation in Tanzania was used as the springboard in getting government and villagers to share ideas about issues regarding the environment and the proper management of resources. This participation resulted in the active involvement of the local community in the formation of strategies and in their implementation.

Monitoring and Evaluation

The evaluation of the ICM program should be derived from the outcomes of the program (*see also Session II*). The group maintained that it is important for problems and issues garnered from the ICM initiatives be made known. Furthermore, it is recognized by the participants that ICM programs should be subject to regular monitoring and evaluation as a way of continually improving the process as well as learning from it.

Information for Management

This session addresses data and information requirements for policy and management decisions regarding ICM program formulation and implementation. The session also presents some tools and methodologies considered appropriate in generating useful scientific and socioeconomic information.

Information Needs

Delays and inappropriate management decisions in the development of ICM programs and functional zones often result from the lack of a reliable database, inadequate use of scientific and socioeconomic information, and the lack of communication between decision makers and scientists. The following section touches on the need to provide decision makers with useful scientifically-based information to overcome said problems, specifically in the formulation of policy, ecosystems management, institutional strengthening and public awareness.

Information Needs for National/Regional Policy and Planning

Although participants were in full agreement that ICM initiatives are best implemented at the local level, there are areas which require the intervention of the national government through the formulation and implementation of national coastal policies. National policies will provide the necessary commitment, guidance and support for ICM initiatives. Appropriate information on the physical, biological and socioeconomic conditions must therefore be obtained in this direction.

Both Dr. Nguyen Chu Hoi and Prof. Hong Huasheng stated that a national coastal policy will facilitate the resolution of multiple resource use conflicts such as those experienced in South Vietnam and China, respectively. Dr. Chu Hoi stated that management policies must not focus on human activities alone. He believed that management policies focusing on human activities rather than the ecological systems which sustain them actually

encourage conflicting use of the coastal systems. On the other hand, Prof. Hong highlighted the need for a sound socioeconomic assessment as basis for policy formulation. She stated that cumulative impacts of sectoral development result in visible damages, such as siltation at ports and harbors; and adverse effects on navigation, aquaculture, and nature reserves.

The need for a national policy or a broader regional policy on environmental planning and management was echoed by Dr. Brian Morton whose concern centered on the continued degradation of natural reserves in Hong Kong. He stated that these natural reserves may well become a transboundary issue within China after 1997. A regional/national policy on conservation is considered vital to protect the reserves from new development activities from the neighboring Guangdong province in China. Information on seasonal tidal flows and ways to integrate development activities between the two provinces to address environmental and conservation issues were identified as necessary to contribute to regional policy planning.

Socio-Cultural and Economic Information for Ecosystem Management

A clearer understanding of the interdependence between the ecological and the socioeconomic environments can contribute to better choices in appropriate management interventions.

In his paper, Prof. Apisit Eiumnroh stated that effective integration of physical characteristics, such as mangrove forest type and density, water quality and soil characteristics, with socioeconomic characteristics (i.e., economic status, shrimp culture practices, etc.) is possible. For example, shrimp culture in Thailand involved the use of such information to carefully design seawater intake and outlets in shrimp farms. He reported that the aquaculture site could be developed to its full carrying capacity if improvements on waste water treatment and water quality control were undertaken. However, it was considered necessary that shrimp farmers are made aware of disease problems and are willing to adopt identified prevention and curative measures.

It was pointed out that in many instances, shrimp culture intrudes into mangrove areas, even protected ones. The lack of reliable and accurate

information on the value of mangrove resources and better options for promoting shrimp farming makes it difficult to counter the otherwise lucrative shrimp farm development.

In their papers, Prof. Hong and Mr. Xu Mo stated that economic consideration is crucial in sustaining coastal management actions. Prof. Hong pointed out the lack of efficient methods for environmental evaluation and resource valuation. She stressed that it is vital to improve these existing methods to identify specific management techniques in mitigating environmental problems.

Mr. Xu further stated that it is critical to establish a financial mechanism for the continuous input of funds used in the protection and conservation of the environment. In his paper, funding for coastal management initiatives comes from various sources, such as levy for discharges (similar to the Polluter Pays Principle), levy for the use of coastal areas, fees for sewage treatment, profits generated from sewage treatment or other coastal development projects, and donations. Mr. Xu stated that the possibility of establishing a "Marine Environmental Management Fund" in Xiamen is being explored.

Information that Contributes to Institutional Strengthening, Public Awareness and Community Support

Paper presenters highlighted the importance of institutional strengthening in the development of a well-planned program, specifically for mangrove resources management. Different dimensions of policy and institutional strengthening and planning were described from declaring the mangrove areas as forest land as in the case of Karnataka, India, to research into the historical and institutional dimensions of resource management as in the case of the Philippines, described by Mr. Cesar Abrenilla.

The existing institutional environment in Cambodia, for example, exhibits a poor collaboration between local and central authorities, the absence of environmental laws and the lack of community participation. Mr. Chin Samouth further cited the presence of external pressure from foreign investors who try to influence national policy for their own benefits.

Prof. Chia Lin Sien initiated a lively discussion on community participation when he commented that Singapore has the financial resources

and that only political will, not community participation, is required for their program to be successful. It was promptly pointed out by Dr. Niel Malan from South Africa that the situation is different in different countries but community participation is definitely a key element for the success of ICM. There was a general consensus that ICM should benefit communities if community support is to continue.

The importance of linking scientific and management information to public awareness and environmental education programs was another theme for discussion. It was agreed that part of the ICM based research programs and projects be designed to create public awareness and raise community support for environmental management actions.

All presenters affirmed that the people's support and participation should be facilitated through appropriate "education," seminars and trainings. Both Ms. Naomi Elkington and Mr. Chin stressed that these preparations will increase and strengthen the involvement of the local people in management and conservation activities such as mangrove afforestation.

Many participants agreed with Mr. Abrenilla on the importance of human factors and people's psyche in identifying problems, issues and recommendations essential to policy formulation and management actions. His paper stressed the need to educate the public in so far as their low levels of awareness, perception and slightly favorable attitude towards change are concerned. He also mentioned the need for more serious community organizing activities to catalyze the immediate development of the socio-economic base of the coastal communities.

Questions were raised on the lack of incentive for scientists and researchers to translate their research results into information and educational materials. It was suggested that ICM programs take this into consideration when supporting management-oriented research by incorporating information dissemination as part of the research program. This can be imposed upon by donors of the program. During the discussion, it was noted that, in South Korea, research programs on coastal management are normally initiated by the academe; whereas, in China, research initiatives stem from the government. In the latter case, information dissemination can also be an activity of the government.

Current Approaches and Methodologies in Data Gathering

Coastal management is information driven, hence, approaches and methodologies for data gathering are crucial in developing a reliable database. The papers presented covered topics on management techniques and approaches in data gathering, ranging from computer modelling, the use of geographic information systems (GIS), and environmental impact assessments (EIAs).

Scientific Approaches in Aquaculture and Mangrove Management

The importance of scientific knowledge in the management and conservation of mangroves in Thailand was discussed by Dr. Sanit Aksornkoae. Previous mangrove management experiences, dictated by inadequate scientific knowledge, led to uncontrolled and destructive use patterns associated with conversion of mangrove forests and negative effects from other human activities such as pollution. During the last decade, various scientific studies on mangrove ecosystems were intensively carried out, including resource assessment, the use of LANDSAT images, growth increments, stocking and natural regeneration studies of mangrove forests, and have resulted in the formulation of land use zoning, various mangrove management systems for integrated forestry and fishery production, mangrove restoration and establishment, and public awareness tools.

According to Prof. Rudolf Wu, impacts resulting from aquaculture activities can be significantly reduced by careful site selection, control of stocking density, improved feed formulation, and integrated culture (with macroalgae filter feeders and deposit feeders). He introduced the use of a water quality modelling technique consisting of the following: (a) a two-dimensional, two-layer hydrodynamic model to simulate tidal flows, and (b) a three-dimensional tide averaged water quality model for the assessment of organic and nutrient input on the quality of the receiving water. The water quality model was used to determine the carrying capacity of water in relation to culture stock. Prof. Wu stated that the model can serve as "an effective tool to help management decisions on the maximum fish stock permissible at a particular fish culture site so that acceptable water quality objectives can be met for the sustainable development of the industry."

A lengthy discussion was initiated by Prof. Chia on the issue of environmental assessments. Conducting EIAs is, at times, a cumbersome process. It was suggested that EIAs be built into the planning process at all levels and not reserved only for large projects. Also, EIAs are more effective if prioritization of the main effects and follow-up action are done. There was, however, varying opinions among the participants on the prioritization process. A general consensus was reached that policy and decision makers should be convinced that conducting an environmental assessment is important and that its purpose is not only to get permission for a project, but to protect the existing environment from cumulative impacts of any development activity.

Geographic Information System

The usefulness of GIS as a powerful tool for land use planning and evaluation, particularly zoning, was discussed in the papers of Mr. James Paw, and Dr. Pipat Patanaponpaiboon, et al. Mr. Paw stated that, in coastal areas, GIS can be used to support resource evaluation, determine the spatial status of resources, and identify sites for new forms of development. GIS can also be used for risk assessment associated with natural and man-made hazards.

In their paper, Dr. Pipat cited the usefulness of GIS in coastal planning for sustainable aquaculture in the southern part of Thailand. GIS was specifically applied to assess land use for shrimp culture. Several parameters identified as data needs for the generation of land suitability maps include: land use maps; location maps of the different aquaculture activities, river banks and canals that have access to seawater; existing locations of resources and special areas such as fisheries, mangrove forests, coral reefs, seagrass beds and other potential recreation sites; community and industrial areas; mapping of environmental conditions such as soil characteristics, water quality parameters, and tidal currents; and, support facilities such as port development. Details on coastal aquaculture were also given including management guidelines and recommendations to reduce or avoid related environmental impacts.

During the discussion, an opinion was expressed that caution must be exercised in the use of GIS for ICM as the quality of information will depend on the accuracy and scope of available data. Otherwise, the exercise leads to useless results. It was also pointed out that most commercial GISs are not yet capable of demonstrating the dynamic nature of coastal areas and systems. It can, however, demonstrate the situation at specific points in time and generate two dimensional representations of reality.

Participatory Approach

Mr. Makoloweka stated in his paper that the use of the participatory approach is seen as a fruitful endeavor in mobilizing communities. In particular, Tang's Coastal Zone Conservation and Development Program used semi-structured interviews, focus group discussions and resource mapping with the help of government extension workers functioning as facilitators. These activities resulted in the formation of environmental committees, the deputization of fishing gear inspectors, the formulation of by-laws, and the creation of a coral reef zonation scheme. Even local village-based trainers were identified through these participatory methods.

Socioeconomic Instruments

Mr. Yao Lixin outlined a number of approaches to assess socioeconomic impacts resulting from rapid urban development. During the discussion, several opinions were expressed on cost-benefit evaluation. One view dealt with the non-restriction of cost-benefit evaluation to include intrinsic and "spiritual" values. However, it was argued that although "spiritual" value needs to be considered, it should not be overstated. Overstating values may create difficulties in convincing policy makers of its importance.

Public Education Approach

Ms. Sunwook Hong discussed the successful management education program of Chinhae Bay in Korea. The objectives of the program were to broaden general public understanding on environmental issues and recognize the rights of coastal residents. The public education program accomplished the following: created hands-on activities and developed practical materials for target audiences; supported, educated and trained individuals to introduce

young people to environmental issues; promoted environmentally responsible behavior toward coastal resource use and protection of marine environment; and raised public participation in environmental decision making.

Ms. Hong reported that the educational materials were specifically designed for Grade 5 to 8 students. She stated that the educational program and the materials prepared were very effective in creating public awareness in the coastal and marine environments for students. It was agreed that the Korean experience may serve as one model for the preparation of public educational and awareness materials for other countries.

Engineering Solutions to Coastal Problems

The session also touched on some engineering and technological solutions to coastal environmental problems such as solid waste management, preventive and mitigating measures of water pollution, and erosion control.

Solid Waste Management

The paper by Mr. Xue Xiongzhi introduced the solid waste management (SWM) system operating at the city, district and sub-district levels in Xiamen, China. Sanitary teams from the sub-district office, resident's committees and sub-district management office play important roles in waste management. The paper emphasized the need to drive the management of solid waste towards minimization and re-use. A well-operated monitoring system as well as effective laws and regulations have contributed to the successful implementation of the system. The present system is designed to address wastes from land-based activities but efforts are still needed to address waste generated from sea-based activities.

Control and Preventive Measures to Improve Water Quality and Aquatic Life

Both Mr. Lu Zhenbin and Mr. Hao Songqiao reported on the effort of the Xiamen government in the cleaning up and management of the Yuan Dang Lake by employing an integrated approach. After approximately ten years of intensive technological and management interventions, the once

heavily polluted lake has shown improvements in water quality, subsequently, promoting the return of aquatic life. Integration of control measures such as waste disposal, termination of pollution sources, dredging operations, construction of a tide-entering diversion canal, and reforestation activities were performed. In addition, separate drainage systems in the new city, waste water interception pipelines, efficient waste water treatment, use of tidal fluctuations to flush out stagnant water, among others, were some of the technological interventions used.

Erosion Control

Based on sand transportation studies, Mr. Chen Jian suggested the use of offshore parallel groins and angled seawalls to control erosion of beaches.

Planners and Decision Makers' Viewpoints

Before the conclusion of the session, Dr. Chua, invited government planners and decision makers present to express what they would require from scientists and researchers to help in their decision making. One public official pointed out that it was useful for scientists to realize that there are times when politicians could not afford to consider long term environmental management issues. Other salient points of the discussion included the following:

- ICM is feasible but would require cooperation with technical groups and the consideration of social factors.
- Management has to be a combined effort with indigenous knowledge incorporated into the process. Science and traditional knowledge should not be used in isolation.
- There is a need for scientists to present information in a format that could be readily used by planners and decision makers.
- Most planners are interested to know: (a) What are the indicators of success or failure? (b) How are these measured? and (c) How is field data analyzed to obtain information for decision making?
- There is a need for a mechanism to bridge the communication gap between planners and scientists.

In retrospect, it is recognized that science plays a role in ICM. Scientific input includes information from mapping, establishment of baseline conditions, data management, quantification of problems and their causes, predictive modelling, impact assessment, formulation of mitigation measures and systematic long-term monitoring. The importance of scientific input to ICM, however, is downgraded because the mechanism of packaging scientific information is not in a form readily understood by politicians.

In conclusion, because of limited financial resources, it was the general consensus to use the available "resource management-oriented research" finances to produce scientific information which can be effectively used by policy makers and resource managers in choosing appropriate policy and technological interventions.

Human Resources Development

The development of capacities at the national and local levels to plan and manage the coastal zone is a fundamental step in ensuring a successful ICM program. This session identifies major gaps in human resources development for ICM and proposes appropriate actions for their resolution.

Training Initiatives

The importance of building human capacity simultaneously at the community level and within central governments was stressed by Dr. Sorensen in his keynote address. In a parallel discussion, Dr. McManus emphasized the importance of enhancing capacity building at the initial stages of an ICM program through training and education (*Session 1*). The following two papers conveyed different dimensions of capacity building to support the effective implementation of ICM. However, education, training and networking were identified as the general modes of enhancing human resources development.

In his paper, Dr. Kenneth Brown discussed the training program developed at the Institute for Coastal Resource Management at the University of Technology in Sydney, Australia. Emphasis was made on the development of a dialogue between sectoral agencies, community groups and other interested and affected parties to promote the effective exchange of information and to establish a broad body of support for ICM. Issues and concerns that are to be addressed in the training course must be identified through consultations with the different agencies and interest groups. These consultations will also help determine the level of capacity to focus on. Also, "community of interests" must be tasked to monitor the training program and to evaluate its effectiveness.

In their paper, Drs. Chua and Yu presented a training program based on a three week course combining formal lectures with sequential visits to demonstration sites in Batangas (Philippines), Xiamen (China) and Singapore.

They stressed that the combination of practical field studies with more theoretical lectures and seminars allowed the participants to see how ICM concepts and tools were applied in solving problems such as environmental degradation and intersectoral conflicts.

Need for Coastal Managers

There is a shortage of suitably trained coastal resource managers with knowledge and technical skills to implement ICM. Based on a study initiated by Dr. Chua and Ms. Irene Pamintuan, one coastal manager for every 30,000 people in coastal municipalities is needed. However, the usefulness of the estimate is limited due to the insufficient training conducted on effective management to coastal managers at the senior level. This has brought about constraints in the development of ICM at the local level.

During the discussion, Dr. Chou Loke Ming stated that managers at the senior level who could benefit from ICM trainings are often reluctant to take part in role playing and find it difficult to make commitments for the training time required. Management is also considered ineffective and time wasted when critical issues and problems are not adequately addressed.

According to Drs. Yu and Chua, there is a need for coastal managers who have the following characteristics: strong interpersonal skills, a holistic approach to coastal resources systems, a broad knowledge of human activities directly or indirectly associated with coastal resources, and a sensitivity to the interests and concerns of different interest groups.

Coastal Manager As Team Player

Dr. Brown emphasized the importance of multi-disciplinary collaboration with the coastal resource manager as a team player. Trainings must be conducted to persons who are capable of coordinating management teams. As a team player, knowledge of the different skills and aspects of management is essential. For this reason, training must include the development of a variety of specific skills, such as how to involve community groups in the ICM process; conflict resolution; involvement of local people in environmental monitoring; and technical skills such as the use of GISs.

Effective Leadership

Drs. Yu and Chua emphasized the need for effective leaders in the development of ICM projects and programs. Effectiveness will be seen in the successful promotion of intersectoral coordination and in the stimulation of active participation of all interested and affected parties in the formulation and implementation of ICM programs. An analogy of the coastal manager as the “conductor of the symphony” was made where the individual players are made up of specialists.

During the discussion, Dr. Olsen suggested that the issue of leadership skills for ICM be divided into two levels, namely, people who work in governments, industry, non-governmental organizations and people who work at the community level such as members of NGOs. At the community level it was suggested that local persons be trained in a similar manner as extension workers.

Dr. Olsen continued that the image of the “symphony conductor” is considered appropriate but dependent on the ability of the individual players to play the same music in harmony. In this sense, the specialist—engineers, biologists, chemists, etc.—need training on ICM concepts, principles and practices that will help them work in concert.

Training Needs for ICM

Dr. Chou and other participants raised pertinent points regarding training needs for ICM, namely:

- There is a need to identify all available training programs in Asia and to review their effectiveness. This could then be developed into an Asian Training Network.
- The UNDP is in the process of developing the “TRAIN-SEA-COAST” Program which uses the “Train-X” approach to human resource development. The approach is based on the creation of intercountry cooperative training and human resource development networks of training/educational centers that agree to join the global network and share the training development task.

- There is a need to find more effective ways to exchange information and experiences concerning training user groups, planners, managers, policy- and decision-makers (*see also Session VII*).
- There is a need for effective “coastal commandos” who could deal effectively in sorting out urgent problems. This notion was met with some approval, but it was also stressed that regional programs need to be developed to train more trainers, provide them with effective support, and to develop effective means of assisting trainers and trainees in communication.
- A strong plea was made for a stronger base in education regarding ICM concepts and approaches. It was stated that tertiary institutions in Asia are slow in providing ICM training. Strengthening the ability of universities and other centers of higher education is important.
- Training at the professional, in-service level is also important.
- Mention was made of library training courses where librarians are trained in information management and then issued with a computer to take back to their institutions. This proved highly effective and the question was raised whether it can also be applied to ICM training to promote more effective communication.
- The donor agency approach which gives emphasis to the “training of trainers” will need follow-up support in the form of technical advice or appropriate materials.
- A constraint in effective training was identified as the movement of trained persons to new positions and not being able to put to use what was learned during the training course. This problem must be studied and ways in improving the situation must be identified.

Good Practices

Effort was made to come up with recommendations of good practices in the formulation, design and implementation of ICM initiatives. The guiding principle was that ICM is a dynamic process to be applied to different development situations and to adapt to changes in development conditions over time. The participants formed into three discussion groups.

Group 1. "The Application of ICM in Different Development Contexts." The discussion dealt with a range of development situations from highly urbanized societies to those highly dependent on renewable natural resources generated by coastal ecosystems. It covered the following topics: environmental change; goods and services generated by resource systems; coastal influences; common property resources; and, cumulative impacts.

Group 2. "The Maturation Process of ICM." Discussion centered on how ICM can adapt to evolving economic, social and environmental conditions. The group addressed the following topics: interactions and interdependence among sectors; time required for maturation of the ICM program; coastal policies; processes in planning, implementation, monitoring and evaluation; involvement of stakeholders; management actions; and, information and management-related research.

Group 3. "Key Factors that Contribute to the Success of ICM." Elements of good ICM practices for design and implementation to meet development objectives were identified. Discussion centered on: ICM systems; stakeholders; integration and coordination; effectiveness of ICM at the local level; preventive and precautionary approaches; cost-benefit analysis; sustaining political will; ICM capacity; and, sustainable financing.

The deliberations of the three groups were presented to the Plenary Session of the workshop. A final report regarding elements of good practices on ICM was prepared by the chairperson, facilitator and rapporteur of the working groups (*Annex I*). The report represents the consolidated findings on "good practices" for formulating, designing, implementing and extending ICM initiatives in the developing countries in Asia and the rest of the world.

Integrated Coastal Management: Opportunities and Initiatives

This session presents opportunities and initiatives in ICM both at the regional and local levels. A number of recent initiatives in East Asia are also presented.

Opportunities in ICM

Dr. Clark opened the session by presenting an illustration of how the ICM process can help solve coastal problems of the 21st century. Treating the terrestrial and water resources of the coastal zone as a single interacting unit and recognizing its multiple-use value, will make the approach in management more comprehensive and integrative. It will require the support and cooperation from different levels of government in terms of regulations and environmental assessment and the active involvement of other stakeholders such as the private sector and local communities. He then stressed that the key to long-term planning and management is dependent on how strategies of coastal management are organized from the start of the program, such as in-site selection.

In his paper, Dr. Clark reiterated that it is more effective for the site to have a narrow primary zone which can later be expanded into a larger secondary zone. As discussed in Session III, a narrow primary zone is seen to be more effective in getting the political support from elected or appointed politicians as compared to the watershed approach. This is because the watershed approach is more a cooperative rather than a directive approach. Also, politicians are known to fully support a narrow boundary site than a wider and broader boundary site. Finally, the narrow primary zone approach is said to have a higher success rate.

Dr. Clark, as well as other participants, recognized ICM as a viable approach to provide ample opportunities. During the discussion, many of these opportunities were enumerated, including: opportunities for interagency collaboration and interdisciplinary research towards identified objectives;

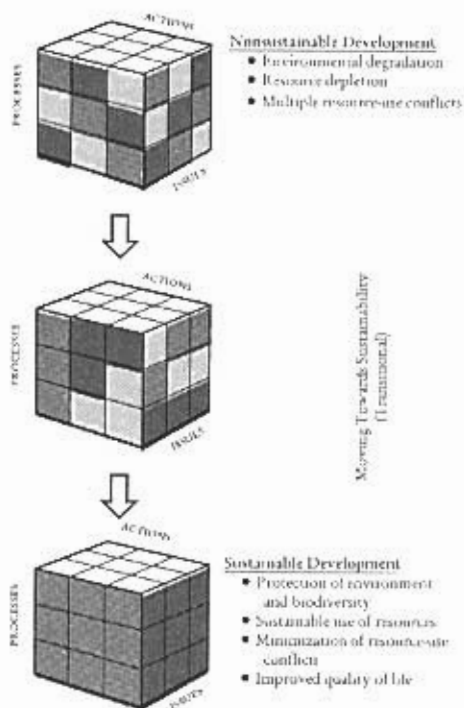
enhancement of the chances of success in addressing difficult and complex coastal management problems; opportunities for local government support; and, the creation of opportunities for livelihood programs and business in technological interventions.

Regional, National and Local Initiatives

Two regional initiatives were reported. Dr. Chua gave a summary report of the GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas (MPP-EAS). MPP-EAS uses the ICM framework to holistically address marine pollution from land- and sea-based sources. Two demonstration sites were established to develop management models; one in Xiamen Municipality, China, and another in Batangas Bay in the Philippines.

The application of ICM for marine pollution management is based on the conceptual management framework, the operation which is analogous to a "Rubik" cube (Figure 3). Using this framework, and with time and experience, coastal managers will be able to attain a high success rate in implementation.

Figure 3
ICM Framework



Management in the Xiamen demonstration site is focused on the following:

- an institutional mechanism for coordinating the planning and management of coastal and marine areas;
- a legal base for an institutional mechanism and harmonization of national and international legislation;
- an integrated law enforcing mechanism involving various law enforcing agencies;
- an environmental monitoring mechanism to track changes from management interventions; and
- a sustainable financing mechanism to sustain ICM programs.

The Batangas Bay demonstration site, following similar strategies, focused on the implementation of voluntary agreements among the private sector for waste minimization, thereby demonstrating cooperation between the private and the public sectors. In both projects, human capacity building through training courses and networking, was the core ingredient linking all participating countries in the East Asian region towards attaining sustainable development of coastal resources.

Dr. Chua maintained that the next step is in the replication of demonstration sites in each of the participating countries. He highlighted progress in establishing demonstration sites in Mansan Chinhae Bay in the Republic of Korea, Nampu in the Democratic People's Republic of Korea, Sihanoukville in Cambodia, Haiphong and Nha Trang in Vietnam, three more sites in Southern China, and another three in the Philippines using UNDP's country indicative planning figure (IPF). Linked to each of the demonstration sites are institutions or individuals dealing with legislation, monitoring, research and training in the form of regional networks. A network of local governments will also be established among all ICM demonstration projects within the region.

Initiatives of the Coordinating Committee for Coastal and Offshore Geoscience Programme in Southeast and East Asia was in the implementation of the COASTPLAN Programme, which is basically the input of geoscience data, such as geological history, sedimentation rate, sea-level and tectonic history, into ICM. One of the program's major component is the conduct of roving seminars to transfer and exchange geoscience knowledge to regional and national bodies.

At a local level, the countries of Vietnam and Cambodia presented papers that established the need for ICM to be implemented in the coastal zones. In light of future development in the coastal areas, existing laws, policies and regulations in both countries are considered inefficient because of the lack of implementation and the generally sectoral nature of development and management.

During the discussion, environmental assessments, feasibility studies, information drives and the establishment of networks between different stakeholders were recommended to help resolve conflict between economic development and environmental conservation. Also, it was generally agreed that the involvement of the central government in centralized economies is essential because they successfully control development in every field.

Prof. Xu of the State Oceanic Administration presented China's new initiative to establish three demonstration sites in the provinces of Guangxi, Guangdong and Hainan and an ICM training center in Xiamen. The new initiatives were identified after the success of the Xiamen demonstration project. With possible support from UNDP country IPF, the Chinese Government hopes to use the three demonstration sites to illustrate the effectiveness of ICM for port, aquaculture and tourism management.

A summary of the major points discussed during this session is presented below.

- Lessons learned from ICM initiatives must be made available to present and future ICM practitioners through the establishment of an ICM network of practitioners.
- The web sites in the Internet should cover as many ICM sites as possible and information must be made available to the users.
- A system of monitoring the progress of ICM in other parts of the world, such as in South America and the Caribbean Islands must be established.
- Seminars and trainings in the transfer and exchange of knowledge to regional and national bodies must be continued to bring together participants of ICM and related programs.
- Support geared towards capacity building to less developed nations is necessary.

- Linkages must be established with research and training institutions for capacity building efforts.
- Linkages with legal experts to harmonize national legislation with local and international legislations must continue to create greater coordination.
- Financial support is important for the implementation of an ICM program or any related programs. Thus, sources of financial support must be identified and pursued.
- A political benefit cost analysis to effectively promote ICM among elected and appointed politicians is necessary.

Annexes

Good Practices in ICM Initiatives

The following outlines good practices which applies to all coastal management situations:

Adopt a Systematic, Incremental Approach in Developing and Implementing ICM Projects and Programs.

ICM should be developed in a systematic manner which allows time for soliciting financial resources and building local managerial and technical capacities for supporting the identification and implementation of appropriate technological interventions; promoting interagency and stakeholders cooperation; and, fostering perception and attitude changes among policy-makers, resource and economic managers, and research scientists.

It is appropriate to apply ICM at a local level and then proceed to more ambitious district, provincial, and national programs after sufficient expertise has been developed. While it is beneficial to have a broad base of national support which can facilitate sectoral cooperation and consistency in policies, it is essential that ICM initiatives build strong public support through the integration of interested and affected parties (stakeholders) into the ICM planning and management processes.

Apply ICM framework for sectoral management.

Systematically employ the ICM framework to administer a combination of policy, management and technological interventions to address issues arising from sectoral economic development. The ICM general framework can help in the effective management of fisheries, aquaculture, tourism, ports, marine parks, etc.

Use a combination of management actions.

In developing an ICM initiative, consider the application of a combination of management actions, including market-based and regulatory instruments, education and training programs, and alternative forms of livelihood.

Adopt precautionary approaches.

Adopt the precautionary approach to development. This means that development should not proceed where there is insufficient information on the possible social, economic, and environmental effects on which to base a decision as to whether such effects are acceptable. This will prevent or minimize use conflicts, adverse impacts, and irreversible loss of future development options.

Strictly follow the ICM procedure.

Follow the step-by-step processes of planning, implementation, monitoring, and evaluation. These processes are integral and sequential parts of the ICM program design. Strict compliance ensures the successful implementation of the program and the improvement and refinement of its management measures.

Involve the Public in the ICM Process.

Involve the stakeholders at all phases and levels of an ICM program development and implementation. Broad public support helps to enhance awareness of the special features and values of the coastal zones at all levels from local communities to decision-makers. The public and private stakeholders can contribute to the identification of use conflicts and environmental management problems, determination of their causes and effects, and assistance in their resolution. A broad body of public support also provides a mechanism for consultation, coordination, and, eventually, integration of the efforts of different government agencies to bring about sustainable coastal development.

Integrate Environmental, Economic, and Social Information from the Very Beginning of the ICM Process.

Emphasize the integration of environmental, economic, and social information at the very start of the coastal development projects and programs. Due to the complex and dynamic nature of the coastal systems, it is very important to have good scientific information. Sound scientific information can strengthen the planning and management processes and help monitor the effectiveness of plans and management strategies.

Information gathering is a continuous process in the ICM cycle, enriching our knowledge as the process progresses. The main role of research is to ensure the availability of information at each strategic stage of ICM development. While much of the baseline information may be available, hard data on ecosystem dynamics and interactions between the resource users and coastal ecosystems are often lacking.

Filling such data gaps may require considerable research effort and time. Most countries have a wealth of secondary information relating to demography, the physical environment, and the political, cultural, and socioeconomic conditions which will influence the formulation of coastal policies and environmental management strategies. However, much of the available information may be in the custody of line agencies, the archives of universities, and the personal collections of experts. Therefore, these sources of information should be identified and arrangements made to retrieve, process, and analyze the available information to form a systematic coastal environmental

profile. The coastal profile will help identify critical gaps in information which may have to be filled through new research.

Promote management-oriented research.

Set the research agenda to narrow the information gaps and to strengthen the scientific basis for management. It must be emphasized that the collection and analysis of environmental, social, and economic data can be very expensive and time-consuming. Priority should be given to the acquisition of information that will help solve important problems and issues and provide a sound base for formulating plans and management strategies.

Effective research can identify alternatives for the sustainable economic development of the coastal areas and resources and anticipate potential adverse impacts. Effective measures to mitigate potential adverse impacts can be identified and built into the ICM projects that would complement the set economic, social, and environmental development objectives. Where unavoidable adverse impacts are identified, Environmental Impact Assessment (EIA) may be required.

Integrated EIA in ICM program development and implementation.

Applying EIA at an advanced stage of the project or program planning often has been proven less effective in modifying project/program design. The proactive use of environmental, economic, and social information early in the ICM process can reduce greatly the need for costly and time-consuming EIAs. It clearly identifies the nature of impacts and factors needed to be assessed in order to determine whether modifications to the project design or additional mitigation measures can reduce the adverse effects to acceptable levels.

Use the Integrated Environmental Impact Assessment (IEIA) as an effective screening and diagnostic tool for measuring adverse environmental changes caused by the cumulative or synergistic impacts of economic activities. IEIA enables the ICM program to establish proactive or reactive responses within the limits of the environment's carrying/absorption capacity. ICM enables IEIA to be more focused and effective in areas or zones designed for multiple forms of development.

Consider common property features in economic assessments.

Ensure that the common property features of the coastal resources are fully incorporated into the economic assessments of the value of coastal areas and alternative forms of development. The long history of coastal development in Asia and other tropical regions has led to the development of complex patterns of resource use and rights of access to natural resources. Many of the natural systems, e.g., coral reefs, estuaries, mud flats, seagrass beds, and mangroves are considered part of the public

domain or *common property* of society. Traditional forms of resources management often cannot be maintained under conditions of rapid population growth and pressures to expand and intensify development. ICM helps avoid or alleviate the problems associated with overexploitation and degradation of common property resources by such measures as allocation of user rights, zoning areas for multiple-use management, and the introduction of improved resources management practices.

Include cost-benefit analysis in the assessment of development alternatives.

Conduct a cost-benefit analysis to facilitate the adoption and approval of the ICM program. Consider both the direct and indirect values of natural resources, i.e., the economic and environmental goods and services generated by the coastal ecosystems. Exercise caution in the valuation of cultural, *spiritual*, or less tangible aspects which can be highly variable, depending on the interests of different social or economic interest groups. Qualitative values associated with the non-consumptive use of the coastal and marine resources can be important to policy-makers.

Establish Mechanisms for Integration and Coordination.

Develop institutional mechanisms which facilitate integration and coordination of the ICM program. Integration and coordination are mutually supportive elements.

Integration brings about the harmonization of policies and legislation between national, provincial/state, and local governments; closer management linkages between resource systems; and, better functional coordination among concerned resources governance and management agencies. Integration begins at the initial planning stage.

Coordination plays a central role in fostering understanding and cooperation among stakeholders, line agencies, researchers, policy-makers, and resource managers. An institutional mechanism for coordinating the development and implementation of the ICM program is essential, especially at the local level. Such a mechanism is more acceptable for it is built upon an existing management structure.

Establish Sustainable Financing Mechanisms.

Develop sustainable financing mechanisms within the ICM program in order to ensure program continuity. This is equally important as the establishment of appropriate institutional mechanisms. In the formulation of an ICM project or program, sources of finance which can be used to sustain management activities should be explored before finalizing the project or program plan.

Develop ICM Capacity at All Levels.

Strengthen the capacity of stakeholders to effectively contribute to the ICM program. A major constraint in ICM program is the lack of technical and management

capacities, especially at the local level. ICM requires coastal managers with broad-based environmental management training to lead and coordinate program development and implementation. However, coastal managers with interpersonal skills to coordinate interagency activities, to mobilize human and financial resources, and to direct management-oriented research and information development are not readily available. Unless such capability is established, ICM program formulation and implementation will be difficult. A wide range of technical and professional management skills are required to support the formulation, design and implementation of successful ICM, including:

- (a) Environmental Evaluation and Resources Analysis
- (b) Environmental Economics
- (c) Environmental Impact Assessment
- (d) Geographic Information Systems (GIS) and Information Management
- (e) Sociology
- (f) Law
- (g) Policy and Land Use Planning
- (h) Pollution Mitigating Technologies
- (i) Programme Development and
- (j) Communication.

ICM program needs to employ strategies aimed at strengthening human resources and institutional capacities. One of the best ways to acquire knowledge and practical management skills is through in-service training and active participation in existing ICM programs. Attention also needs to be given to strengthening the abilities of stakeholders to contribute to ICM. This can be addressed through public meetings, extension services, and workshops.

Monitor the Effectiveness of ICM Projects and Programs.

Monitor environmental, social, and economic impacts throughout the life of the ICM program. Due to the complex and dynamic nature of the coastal systems, it is not always feasible to accurately predict the economic effectiveness and environmental performance of ICM projects and programs. This is especially true for tropical coastal systems where scientific knowledge is often limited. Identify factors to be monitored and set out standards and procedures for monitoring early in the ICM process.

Monitoring provides a powerful tool for assessing the performance of projects and gives early warning of adverse effects so that corrective action can be taken to modify the design and management of projects to avoid irreversible impacts. Monitoring also provides means of assessing the effectiveness of the ICM project or program in meeting the established goals and objectives.

Workshop Program

24 MAY 1996, FRIDAY

Chairman: Edgardo D. Gomez,
Coastal Management Center, Phil.

Keynote address: Jens Sorensen
University of Massachusetts,
USA. *"National and international
efforts on integrated coastal
management: What has been
achieved and what lessons have been
learned?"*

Session I Case Studies

Chairman: Ying Wang, Nanjing
University, China

Rapporteur: Liana T. McManus,
University of the Philippines in
Diliman, Philippines

Richard Kenchington, Great Barrier
Reef Marine Park Authority,
Australia. *"Lessons learned from
planning and management of the
Great Barrier Reef."*

Jayampathy Samarakoon, Central
Environmental Authority, Sri
Lanka. *"A review of successes and
failures of ICM in Sri Lanka."*

Wong Poh Poh, National University
of Singapore. *"Coastal tourism
development and management: Case
studies in Southeast Asia."*

Chairman: Magnus Ngoile, IUCN,
Switzerland

Rapporteur: Chou Loke Ming,
National University of Singapore

Biliana Cicin-Sain, University of
Delaware, USA and IOC/
UNESCO, Paris. *"Cross-national
experiences with ICM: Results from an
exploratory survey."*

Chen Guoqiang, Xiamen Coastal
Management and Coordination
Office & Chua Thia-Eng, IMO.
*"From sectoral to integrated coastal
management approach: A case in
Xiamen."*

Liana T. McManus, University of the
Philippines in Diliman. *"The
Lingayen Gulf Experience: If we have
to do it again."*

Somsak Boromthananat, Prince of
Songlka University, Thailand.
*"Integrated coastal management in
Thailand: A case study."*

Chairman: Ranjith De Silva, Coastal
Management Center, Philippines
Rapporteur: Wong Poh Poh,
National University of Singapore

Angel Alcalá, Commission on Higher
Education, Philippines. *"Coastal
resource management as practiced in
the Philippines: A case study."*

Alfredo Isidro, Fisheries Sector Program, Department of Agriculture, Philippines. *"Lessons in coastal resources management: The experience of the Philippine Fisheries Sector Program."*

Peter Mehlbye, Ministry of Environment and Energy, Denmark. *"Coastal zone planning in Denmark from a European perspective."*

Magnus Ngoile, IUCN, Switzerland & Olof Linden, Sida, Sweden. *"Lessons learned from ICM initiatives in East Africa."*

Chiau Wen-Yan, National Sun Yat-Sen University, Taiwan. *"Coastal zone management in Taiwan: A review."*

25 MAY 1996, SATURDAY

Session II Indicators of Success

Chairman: Chua Thia-Eng, IMO
Rapporteur: James Paw, IMO
Discussants: Magnus Ngoile, IUCN, Switzerland
Edgardo D. Gomez, Coastal Management Center, Philippines
Chia Lin Sien, National University of Singapore

Steve Olsen, University of Rhode Island, USA. *"Indicators of successes in integrated coastal management in the United States."*

Peter Burbridge, University of

Newcastle-upon-Tyne, U.K. *"A generic framework for monitoring success criteria."*

Session III Program Initiation, Formulation, Implementation and Evaluation

A. Program Initiation and Formulation

Chairman: John Clark, University of Miami, USA.

Rapporteur: Chia Lin Sien, National University of Singapore

Discussants: Peter Mehlbye, Ministry of Environment and Energy, Denmark

Somsak Boromthananat, Prince of Songkla University, Thailand
Hong Huasheng, ESRI, Xiamen University

Suraphol Sudara, Chulalongkorn University, Thailand. *"Who, how and what to be involved in a successful coastal zone management, Thailand example."*

Jihyun Lee, Korean Ocean Research and Development Institute, Korea. *"Policy and management issues of the Mansan Chinhae Bay."*

Ranjith De Silva, Coastal Management Center, Philippines. *"Coastal management program in Brunei Darussalam."*

Chen Guoqiang, Xiamen Coastal Management and Coordination Office. *"The establishment of institutional mechanism for*

integrated management of Xiamen's coastal and marine resources—The Xiamen Coastal Coordinating and Management Agency."

Aprilani Soegiarto, Indonesian Institute of Sciences. *"Integrated Coastal Management in Indonesia: Problems and plan of actions."*

Chairman: Peter Burbridge, University of Newcastle Upon-Tyne, UK.

Rapporteur: Hansa Chansang, Phuket Marine Biological Centre, Thailand

Discussants: Ranjith De Silva, Coastal Management Center, Philippines
Magnus Ngoile, IUCN, Switzerland
Kenji Hotta, Nihon University, Japan

Ying Wang, Nanjing University, China. *"Planning and development on coastal tidal flats in China."*

Chua Thia-Eng and James Paw, IMO. *"ASEAN-USAID Project on coastal resources management: The planning process."*

Pipat Patanaponpaiboon, Chulalongkorn University, Thailand. *"Planning for coastal aquaculture: A case study in the Southern part of Thailand."*

James Paw, IMO. *"Application of Geographic Information System for the development of functional zonation schemes."*

Rokhmin Dahuri, Bogor Agricultural University, Indonesia. *"Coastal zone*

management and transmigration: The Indonesian experience."

Ahmad Ramli, BAPPEDA, Indonesia. *"Integrating fishery exploitation with the design and establishment of Bakung Island as wildlife (wetland) reserve."*

Kang Tao, Xiamen Municipal Planning Commission. *"Bringing the comprehensive planning of the Municipal Planning Commission into full play to promote a well-coordinated development in ocean economy and environment in Xiamen."*

Li Ye, Xiamen Municipal Planning Commission. *"The compilation of the strategic plan for the prevention and management of marine pollution in Xiamen demonstration site."*

B. Program Implementation and Evaluation

Chairman: Liana T. McManus, University of the Philippines in Diliman, Philippines

Rapporteur: Kenneth Brown, University of Technology, Australia

Discussants: Angel Alcala, Commission on Higher Education, Philippines
Richard Kenchington, Great Barrier Reef Marine Park Authority, Australia

Chia Lin Sien, National University of Singapore. *"Coastal management in Singapore: Institutional arrangement and implementation."*

Chou Loke Ming, National University of Singapore. *"The cleaning of Singapore River: Approaches, methods, investments and benefits."*

Jens Sorensen, University of Massachusetts, USA. *"Legal and Institutional arrangements in coastal management."*

Solomon Jusuf Makoloweka. *"Tanga Coastal Zone Conservation and Development Program, Tanzania Coastal management in Tanzania: A decentralized community-based approach."*

Ezekiel Okemwa, Kenya Marine and Fisheries Research Institute, Kenya. *"Integrated coastal management in Kenya."*

Hansa Chansang, Phuket Marine Biological Centre, Thailand. *"Reef management in Phuket: Lessons learned."*

State Oceanic Administration, China. *"Management on the utilization of sea waters in China."*

James Maragos, East-West Center, Hawaii, USA. *"Integrated coastal management: Basic field monitoring requirements and procedures applicable to Oceania and other small tropical islands and atolls."*

Rapporteur: Jayampathy Samarakoon, Central Environmental Authority, Sri Lanka

Discussants: Hansa Chansang, Phuket Marine Biological Centre, Thailand
Kenneth Brown, University of Technology, Australia

Rudolf Wu, City University of Hong Kong. *"The scientific approach on sustainable marine fish culture."*

Sanit Aksornkoae, Kasetsart University, Thailand. *"Scientific mangrove management in Thailand."*

Apisit Eiumnoh, Asian Institute of Technology, Thailand. *"Coastal zone management successes and failures: An interdisciplinary study."*

Nguyen Chu Hoi, Haiphong Institute of Oceanology, Vietnam. *"Analysis of multiple use conflicts in the coastal zone of North Vietnam."*

Brian Morton, The University of Hong Kong. *"Coastal management for conservation in Hong Kong: The need for integration with China post 1997."*

Naomi Elkington, Ramboll, Denmark. *"Mangroves in Karnataka, India: Ecology and human impacts."*

Chairman: Edgardo D. Gomez, Coastal Management Center, Philippines

Rapporteur: Rudolf Wu, City University of Hong Kong

Session IV Information for Management

Chairman: Biliana Cicin-Sain, University of Delaware, USA

Discussants: Jihyun Lee, Korean Ocean Research and Development Institute, Korea
Rokhmin Dahuri, Bogor Agricultural University, Indonesia

Cesar Abrenilla, Ecosystems Research and Development Bureau, Philippines. *"The Visayan coastal communities: A situational analysis."*

Xu Mo, Xiamen Municipal Planning Commission. *"An approach to the establishment of the Xiamen Marine Environment Management Fund."*

Yao Lixin, Huang Jianxiong and Lin Ling, Xiamen. *"The methods of socioeconomic impact assessment on marine environmental problems caused by coastal economic development: The Xiamen demonstration site example."*

Kenji Hotta, Nihon University, Japan. *"Environment-friendly coastal structures."*

Hong Huasheng et al., ESRC, Xiamen University. *"Cumulative impacts of socioeconomic development in Xiamen coastal zone and its consequence."*

Chairman: Wong Poh Poh, National University of Singapore

Rapporteur: Jihyun Lee, Korean Ocean Research and Development Institute, Korea

Discussants: James Paw, IMO
Ying Wang, Nanjing University, China
Rudolf Wu, City University of Hong Kong

Xue Xiongzhi, Yuan Dongxing, Yang Dongning (Xiamen University) and Huang Jindui (Xiamen Environment and Sanitation Comprehensive Treatment Factory). *"Analysis of solid waste management system in Xiamen coastal zone area."*

Lu Zhenbin, Du Qi, Yan Youming and Liu Weibin, Fujian Fisheries Research Institute. *"Assessing the effects of integrated control and management on Yuan Dang lagoon from the viewpoint of restoration of aquatic organisms."*

Hao Songqiao and Ren Jun, Xiamen Wastewater Treatment Preparatory Office. *"Yun Tang Lake integrated treatment project."*

Hang Zongguo and Tang Senming, Xiamen. *"The impacts of causeway construction on marine biodiversity in Xiamen."*

Chen Jian, Third Institute of Oceanography, SOA, China. *"Analysis of the mechanisms causing beach changes and implications of sea level rise."*

27 MAY 1996, MONDAY

Session V

Human Resources Development

Chairman: Suraphol Sudara, Chulalongkorn University, Thailand

Rapporteur: Peter Burbridge, University of Newcastle Upon-Tyne

Discussants: Stephen Olsen,
University of Rhode Island, USA
Chou Loke Ming, National
University of Singapore

Kenneth Brown, University of
Technology, Australia. *"Capacity
building in integrated coastal
management: Present status and
future prospects."*

Huming Yu and Chua Thia Eng,
IMO. *"A training course on the
application of integrated coastal zone
management for marine pollution
management."*

Chua Thia-Eng (IMO), Magnus
Ngoile (IUCN, Switzerland) and
Olof Linden (Sida, Sweden). *"North-
South and South-South cooperation in
integrated coastal management."*

Chua Thia-Eng (IMO) and Irene
Pamintuan (CMC). *"Estimation of
training needs for coastal planners
and managers in the Philippines."*

Session VI Integrated Coastal Management: Principles and Guidelines

Discussions on ICM Principles,
Guidelines and Recommendations for
future ICM endeavors

28 MAY, 1966, TUESDAY

Session VII New Integrated Coastal Management Initiatives

Chairman: Sanit Aksornkoae,
Kasetsart University, Thailand

Rapporteur: Ranjith de Silva, Coastal
Management Center, Philippines

John Clark, University of Miami,
USA. *"Coastal zone management
opportunity."*

Chua Thia-Eng, IMO. *"Establishment
of networks of ICM demonstration
sites in the East Asian region: From
concept to actions."*

State Oceanic Administration, China.
*"Integrated coastal management in
the northern part of the South China
Sea."*

Salim Mohammed, Institute of
Marine Sciences, Tanzania.
*"Towards integrated coastal zone
management in Zanzibar."*

Bert Van der Valk, CCOP, Thailand.
"Coastplan."

Chairman: Hong Huasheng, ESRC,
Xiamen University
Rapporteur: Ranjith de Silva,
Coastal Management Center,
Philippines

Le Huy Ba, University of
Hochiminh, Vietnam. *"Integrated
coastal management initiatives in
Vietnam."*

Nguyen Tac An, Institute of
Oceanography, Vietnam. *"The
potential for developing ICM program
in South Vietnam."*

Long Rithirak, Ministry of
Environment, Cambodia. *"Proposed
integrated coastal management project
for Sihanoukville, Cambodia."*

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Mr. Lu Zhenbin
Associate Research Scientist, Fujian
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List of Acronyms

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CCOP	Coordinating Committee for Coastal and Offshore Geoscience Programme
DANCED	Danish Cooperation for Environment and Development
EIA	Environmental Impact Assessment
GEF	Global Environment Facility
GIS	Geographic Information Systems
ICM	Integrated Coastal Management
IMO	International Maritime Organization
IPF	Indicative Planning Figure
MPP-EAS	Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas
SEIA	Socioeconomic Impact Assessment
SIDA	Swedish International Development Agency
SOA	State Oceanic Administration
SWM	Solid Waste Management
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme