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Partnerships in Environmental Management
for the Seas of East Asia

Proceedings of the Workshop on Ecosystem- Based Management of Interrelated River Basins, Estuaries and Coastal Seas



Masan, Republic of Korea

1-3 June 2005

**PROCEEDINGS OF THE WORKSHOP ON ECOSYSTEM-
BASED MANAGEMENT OF INTERRELATED RIVER
BASINS, ESTUARIES AND COASTAL SEAS**

*GEF/UNDP/IMO Regional Programme on Building Partnerships in Environmental
Management for the Seas of East Asia (PEMSEA)
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December 2005

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A. INTRODUCTION

- i. Recent findings show that the environmental quality and resource values in many parts of the Seas of East Asia continue to degrade, despite decades of advocacy, political commitments and conservation efforts. River basins that are associated with the Seas of East Asia cover a total area of about 6.25 million km² and accommodate an estimated 1.5 billion people. The health of the Seas of East Asia is significantly impacted by these river basins. Responding to this challenge, the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA) adopted by the Ministerial Forum of East Asian Sea Congress in Putrajaya, Malaysia, on 12 December 2003, calls for the application of integrated management framework to implement the Agenda 21 and the Plan of Implementation of the World Summit on Sustainable Development (WSSD) concerning the oceans, seas, islands and coastal areas. The SDS-SEA specifically includes the application of ecosystem-based management approaches to ensure sustainable development of coastal and marine areas as a general principle.
- ii. The 10th Programme Steering Committee (PSC) Meeting of the GEF/UNDP/IMO Regional Programme on Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) in October 2004 adopted a Programme of Activities for the Implementation of the Sustainable Development Strategy for the Seas of East Asia. Important features of the Programme of Activities were: a) to develop and implement integrated management programmes using the ecosystem-based approach in selected major watershed areas in the Seas of East Asia region; and b) to forge twinning and networking arrangements involving South-South and North-South collaboration to share knowledge and experience in innovative approaches to ecosystem-based management of watersheds, estuaries and the adjacent coastal areas, as well as the effective management of marine protected areas.
- iii. To facilitate further development of the Programme of Activities, PEMSEA and the Ministry of Maritime Affairs and Fisheries (MOMAF) of RO Korea co-organized a Workshop on Ecosystem-Based Management of Interrelated River Basins, Estuaries and Coastal Seas at the Hotel Riviera, Masan, Republic of Korea, from 01 June to 03 June 2005. The specific objective of the Workshop was to identify major challenges to ecosystem-based management of interrelated river basins, estuaries and coastal seas, review

experiences and lessons learned from the practices, and to outline response strategies and mode of implementation for the Seas of East Asia region.

- iv. The Workshop was attended by some 40 experts and professionals from the People's Republic of China, Japan, Indonesia, Philippines, Republic of Korea, Wetlands International Malaysia, NOWPAP and PEMSEA Regional Programme Office. Representatives from local NGOs, media, academe, environmental groups and other institutions in RO Korea were also involved.
- v. A full list of participants and workshop programme are attached as Annex 1 and 2.

B. OPENING CEREMONY

- i. The Deputy Minister of the Ministry of Maritime Affairs and Fisheries (MOMAF) of RO Korea, Mr. Yong-Woo Lee, welcomed all the participants to the Workshop and delivered a message from the Minister of MOMAF, Mr. Oh Geo-Don. He highlighted that MOMAF had been making serious efforts to maintain the health of the marine ecosystem, and as part of their efforts toward marine environment protection, MOMAF organized the Workshop in partnership with PEMSEA. Masan City has been leading the rapid economic development of Korea by serving as a "Free Export Zone" in past three decades. Due to adverse impacts of intensive industrialization and rapid urbanization, Masan Bay has suffered from serious pollution, chronic red-tides and oxygen depletion. To address pollution and habitat degradation, Masan Bay was designated as a Special Management Area in 2000 under the Marine Pollution Prevention Act. A comprehensive management plan for Masan Bay environmental management was prepared in 2004 and is being implemented. MOMAF is also preparing for the application of total pollution load control system in Masan Bay in 2007, which will effectively address the land-based pollution. In this regard, the collaboration with PEMSEA participating countries on ecosystem-based management is very timely and would contribute significantly to the MOMAF's existing efforts. MOMAF will positively consider supporting the regular meeting of the twinning arrangements in partnership with PEMSEA. Finally, he called for the cooperation and active participation of all participants for a successful and fruitful discussion.
- ii. Dr. Chua Thia-Eng, Regional Programme Director (RPD), PEMSEA Regional Programme Office (RPO), delivered his welcoming remarks on behalf of PEMSEA. He expressed his gratitude to the MOMAF for co-organizing and co-financing the workshop. Dr. Chua accorded special thanks to MOMAF's Deputy Minister Lee Yong Woo and Congressman Jong-Jil Ge for their pioneering role in the establishment of a strong relationship between MOMAF and PEMSEA. Moreover, Dr. Chua provided a short backgrounder on the integrated coastal management approach and the ecosystem-based management approach and the benefits of using such approaches in the development and proper management of interrelated water systems. He also informed the participants of the recent developments with regard to approval by the Global Environment Facility (GEF) of the pipeline entry project on the

Implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), wherein the outputs of the workshop could be included. To achieve the objectives of the workshop, Dr. Chua encouraged the participants to share their experiences and recommend appropriate approaches and activities for future collaborations. Furthermore, he challenged the participants to think of ways and means on how to turn the concept of ecosystem-based management into reality. Finally, Dr. Chua wished the Workshop full success.

- iii. Mr. Chol Geon Hwang, Mayor of Masan City, extended his warm welcome to all the participants. He expressed his appreciation to the workshop organizers for hosting the workshop in Masan City, which is famous for its Masan Bay, quoted as the Dream Bay. He explained the City's efforts in improving sewage collection and treatment to reduce adverse impacts in the Bay from land-based pollution. He highly recognized the importance of sharing experiences among management sites and from different countries. Envisioning the sustainable development of the city and its communities, he committed to closely coordinate with MOMAF and other stakeholders for the improvement of Masan Bay environmental quality.
- iv. Mr. Koh, Hyun Wook, Vice President of Kyungnam University welcomed the workshop participants. He reiterated the workshop objectives and recognized the importance of introducing total pollution load control to improve the environmental quality of Masan Bay. Kyungnam University has been contributing to coastal environmental management since 1970s, by conducting scientific research and environmental monitoring. He highlighted that an ICM training center was first established in the University as an early coastal management initiative in RO Korea. He appreciated the presence of the workshop participants and the meeting success.
- v. The Vice President of the Korea Maritime Institute, Mr. Hyung-In Chin, congratulated PEMSEA's efforts to promote ecosystem-based management of interrelated river basins, estuaries and coastal seas, which would significantly enhance the current marine environmental management efforts in the Seas of East Asia. He indicated that KMI was honored to organize this first workshop in Masan in partnership with PEMSEA and MOMAF. Building upon the cooperation between KMI and PEMSEA in the past five years, KMI would continue to provide necessary support for better management of marine ecosystem of the region.

C. KEYNOTE SPEECH

- i. Dr. Jong-Geel Je, Congressman and a former Project Manager of the Shihwa ICM Parallel Site of the Republic of Korea, delivered a keynote speech for the workshop. Dr. Je congratulated MOMAF and PEMSEA for organizing a Workshop focusing on the important issues and challenges of coastal and marine ecosystem-based management. He noted that ecosystem-based management promotes the use of a holistic management approach that gives particular emphasis on the people and their relationship or effect on the ecosystem. In further explaining the concept, Dr. Je highlighted the Putrajaya

Declaration in 2003 and the adoption of the SDS-SEA as an important regional initiative that gives emphasis on the principles of ecosystem management. Furthermore, he mentioned some of the major initiatives undertaken by MOMAF. He informed the participants of the special interest of RO Korea President, Mr. Roh Moo Hyun, in adopting integrated approaches linking land and sea to address threats to the marine ecosystem. Masan-Chinhae Bay thus became a testing ground for practicing integrated ecosystem-based management approaches. He also expressed his concern that integrated management is practiced only by law, not by the vision or the heart of those concerned people yet. He therefore called for sincere efforts of all those concerned in the management of Masan-Chinhae Bay to work together to make changes on the ground. He concluded by wishing a fruitful discussion.

- ii. The full text of speeches is attached as Annex 3.

1.0 PRESENTATION ON WORKSHOP BACKGROUND PAPER

1.1 Dr. Huming Yu presented a workshop background paper, entitled, 'Ecosystem-Based Management of Interrelated River Basins, Estuaries and Coastal Seas: From Concept to Practice,' which carried the following messages:

- Ecosystem-based management is as a systematic approach to addressing a set of issues in consideration of their interactions governed by ecosystem attributes and related socioeconomic consequences. The nature, scope and extent of the management are determined by the ecosystem effects, impacts and consequences, rather than by legal, administrative and disciplinary divisions or boundaries.
- Ecosystem-based management of coastal area and integrated coastal management (ICM) should mean the same thing, as both approaches focus on the development of multisectoral and stakeholder participatory decision making in response to multiple use conflicts and impacts.
- Ecosystem-based management approach as provided in the 1992 Convention on Biological Diversity is not just a concept, but a legal requirement and a practice. The application of such as approach for managing interrelated rivers basins, estuaries and coastal seas represents a serious challenge, but should be earnestly pursued, as there is no better alternative in solving the problems facing us.
- The diversity in the types of social system and levels of economic development is no obstacle to the application of ecosystem-based approach, however the level of application varies, depending on the problems to be addressed and resources available. Experiences and lessons gained can be shared South-South and North-South to benefit all involved.

- 1.2 Dr. Yu informed the participants that PEMSEA is undertaking two mutually reinforced courses of action in fostering the ecosystem-based management programme: capacity building activities in some selected sites; and twinning arrangements among the sites implementing ecosystem-based programmes to distill and extend experiences and lessons learned. He expected that the outputs of this workshop would be a step forward in achieving these objectives.
- 1.3 The full workshop background paper is attached as Annex 4.

2.0 WORKSHOP SESSIONS

2.1 Session 1: Policy Direction for Ecosystem-Based Management of Coastal and Marine Areas

- 2.1.1 The first session focused on the review of policy, legal, administrative, and incentive-based approaches in managing interrelated river basins, estuaries and coastal seas. It also involved the discussions on some of the major issues and constraints on policy development and implementation on coastal and marine management.

RO Korea's Policies and Practices in Managing Coastal and Marine Ecosystems

- 2.1.2 Mr. Keon-Soo Sohn, *Director, Marine Environment Division, MOMAF, RO Korea*, focused on the RO Korea's development of institutional and legal mechanisms for the integrated management of the country's coastal and marine ecosystems. He highlighted the major institutional achievements of the country, such as the creation of the Ministry of Maritime Affairs and Fisheries (MOMAF) in 1996 and the approval of the National ICM Plan in 2000 and Ocean Korea 21 in 2000. Building upon their efforts on strengthening policy and institutional arrangements for integrated coastal and marine management, RO Korea currently attempts to address emerging challenges posed by increased pollution loads, emergence of new hazardous materials, adverse impacts of marine debris and intensive mariculture activities, and atmospheric deposition of pollutants. To effectively address these issues, the MOMAF has prepared long-term strategies and action plans, including the designation and management of marine protected area, strengthening of the country's international collaboration to effectively address transboundary pollution issues, and the creation of adaptive management framework to control pollution loads, such as the development of applicable Total Maximum Daily Load (TMDL) Process.

Management Strategies for the Coastal Environment of the Masan-Chinhae Bay

- 2.1.3 Dr. Kang Dae Seok, Pukyung University, Ro Korea, provided findings of his group on this topic, emphasizing three stages of development: (1) the emerging recognition of the environmental degradation during late 1970s and 1983; (2) implementation of management measures during 1984 to 1999; and (3) application of watershed-based and integrated approach from 2000 onwards. He explained the pressure to the ecosystem of Masan-Chinhae Bay

in terms of population, industrial activities, coastal reclamation, development projects, as well as pollution load exceeding carrying capacity of receiving waters. For example, the total BOD load of 39,219 kg/day was estimated in 2001, while the estimated carrying capacity of receiving water to maintain the water quality class II was 17,257 kg/day. This implies the need for reducing pollution load by 21,962 kg/day. As a consequence, the Bay water quality deteriorated to Class III that is only good for port and industrial activities, with chronic eutrophication and red-tides, depletion of oxygen in the waters, and contamination by heavy metals, PAHs, PCBs, and TBT. Currently management priority is set on reducing organic pollution from land-based sources in the innermost bay through the integrated and participatory management and the application of "Total Maximum Daily Load (TMDL)" management system.

Experiences and Lessons Learned Through the Implementation of National Legislation for the Seto Inland Sea

2.1.4 The presentation by Mr. Jiro Eiho, Water Environment Division, Hyogo Prefecture Government, Japan, focused on the background and experiences related to the enactment and implementation of the Seto Inland Sea Law, which aimed at addressing critical environmental problems such as red-tides, fish kills, loss of marine habitat due to coastal reclamation, etc. Under this law, several comprehensive conservation measures have been promoted: (1) establishment and implementation of the Basic Plan for Conservation of the Environment of the Seto Inland Sea; (2) promotion of the water quality conservation by controlling total load of COD; (3) control of coastal reclamation; and (4) preservation of natural environment. Currently, the efforts are directed toward the regeneration of the Seto Inland Sea, which involves active creation of a new environment and habitats; regeneration of forests, rivers and sea through participation and partnerships among stakeholders; minimization of waste discharge and coastal reclamation; and the application of integrated management system.

Policy Challenges in Governing Complex Coastal System: Application of Strategic Planning Approach to the Case of the Jakarta Bay, Indonesia

2.1.5 Dr. Luky Adrianto, Center for Coastal and Marine Resources, Bogor Agricultural University, Indonesia, highlighted the complexity and policy challenges involved in managing coastal ecosystem of Jakarta Bay. Jakarta Bay is semi-enclosed, receiving 13 rivers, with about 8.5 million coastal inhabitants. Without sewage treatment facilities in the river catchment areas, contaminant discharges cause a high level of organic pollution in the bay, with a chronic algal bloom, occurrence of toxic algal species, oxygen depletion, and mass mortality of marine biota. With a large scale of green mussel farming in the Bay, high metal contents in the sediment (Hg, Pb, Cd) as well as in the tissue of mussels are also imposing a great concern. Addressing environmental problems is further compounded by various socio-economic issues such as poverty, rapid urbanization, waste disposal problems, in addition to lack of coordination among concerned national and local governments. Indonesia recognized the need to undertake strategic planning to efficiently govern the bay. Part of this strategic planning would be

the application of a Special Area Management (SAM) approach which is perceived to be effective in the development of the Jakarta Bay-Regional Coastal Management Body that interconnects with local government institutions. The SAM mainly aims at resolving competing demands on the resources of the Jakarta Bay by planning and identifying optimal sustainable activities. In order to accelerate the management initiative, Dr. Adrianto recommended that a macro-level policy, involving the establishment of coordination, legal and governance framework and the capacity building, should be prepared along with micro-level initiatives involving efforts on waste management, public awareness and improvement of livelihoods.

A Legal Framework and Implementing Mechanisms for the Integrated Management of the Bohai Sea

- 2.1.6 Dr. Liu Yan, China Institute for Marine Affairs, SOA, PR China, stressed the need for further efforts in the identification of what the ecosystem-based management for the Bohai Sea may entail in terms of public policy and legal framework. She informed the participants of China's current attempt to develop a legal framework for ecosystem-based management in the Bohai Sea. As a result, the National People's Congress in December 2004 recognized the need and referred the matter to concerned agencies for further review. The legal framework is grounded on the principles of sustainable development and ecosystem-based management and aims at applying various measures including: strategic environmental assessment; marine functional zoning; total pollutant load control; cleaner production; target-oriented responsibility system; and integrated management system. For the successful implementation of proposed legal framework, it was suggested that inter-agencies, multi-sectoral coordinating mechanism, e.g., "Bohai Sea Management Committee" be set up involving various stakeholders.

Manila Bay Project as a Case Study on Inter-agency and Multi-disciplinary Approach for Policy Development and Implementation of Coastal Management in the Philippines

- 2.1.7 Mr. Robert Jara, Department of Environment and Natural Resources, Philippines, provided an overview of the Philippine coastal and marine environment, giving particular attention to its present status and issues pertaining to the governance of the marine resource. As a showcase of the country's efforts on integrated coastal management, Mr. Jara presented the Manila Bay Environmental Management Project that demonstrated a successful implementation of inter-agency and multidisciplinary approach in coastal and marine management. Under the long-term framework of Manila Bay Coastal Strategy, various implementing measures are being undertaken, including operational plan for the implementation of Manila Bay Coastal Strategy, refined risk assessment, integrated environmental monitoring program, coastal use zoning plan, Manila Bay information networking, Manila Bay oil spill contingency plan, environmental investment, institutional analysis and environmental resources valuation.

Developing Intergovernmental Arrangements and Stakeholder Partnerships in Managing the Chesapeake Bay Environment

2.1.8 Dr. Huming Yu presented a case study on the experiences of the US Chesapeake Bay (CB) Program. The over 20 year old CB program represents a comprehensive efforts in addressing both upstream (the river basins and watersheds) and downstream (estuarine and coastal waters) impacts, covering protection and restoration of water quality, living resources and vital habitats, sound land use and community engagement stewardship, with efforts towards interagency and multisectoral coordination and participation. The implementation of CB Agreement 2000 and the practices of its implementing mechanism, and the CB Executive Council offer valuable experiences and lessons for addressing the concerns of this workshop. In comparison with some practices in the East Asia, the CB program may represent the next level of development in various ways, particularly the development and implementation of Total Maximum Daily Load (TMDL) plans, the tributary strategy, measures to contain sprawling effects, and living resource restoration program. Of particular interest is the development of diversified financing mechanisms, including the state revolving funds for water pollution reduction, government bonds, and cost sharing arrangements between the governments and private operators to encourage the latter to adopt good practices. What drives CB Program forward is the increased awareness and involvement of the stakeholders who keeps a critical eye on the government intervention in maintaining the bay's health, contributing to a transparent policy environment.

2.1.9 The following is the summary of the session:

- a) To put in place appropriate institutional mechanisms including organizational and legal instruments is crucial to ensuring effective policy implementation and the management of coastal and marine ecosystems.
- b) The development of coherent and appropriate policies for the protection and management of coastal and marine ecosystems entails multi-disciplinary research to understand the complexity of ecosystem functions, processes and mechanisms. The cases presented by the different country experts further illustrated the importance of coordination and cooperation between scientists and policy makers in ensuring proper development and implementation of policies.
- c) Engaging various stakeholders and groups is crucial in the process of coastal and marine management. While it may involve tedious and time-consuming processes, such cases as the Chesapeake Bay Program and the Manila Bay Environmental Management Project demonstrated progress in multisectoral and multidisciplinary coordination and participation.
- d) People are considered as one of the most important components of ecosystem-based management, but only few studies and reports have highlighted the human aspect and its role and effect on the ecosystems.

- e) Limited awareness, appreciation and understanding, particularly on the part of the policymakers, have hindered the development and proper implementation of policies on coastal and marine management. Strengthening awareness building activities can help create informed policymakers and knowledgeable public, to promote ecosystem-based management as a major policy concern.
- f) Lack of an appropriate management authority, coordination, and strategy implementation are oftentimes experienced particularly when several agencies are accorded with responsibilities and jurisdiction on a particular ecosystem. Such a scenario can result in overlapping responsibilities, inefficiency and lack of focus and direction.
- g) Various strategies and processes have been introduced and explored to minimize pollution, in particular from land-based sources. The use of the "Total Maximum Daily Load (TMDL)" has been proven effective in some countries in controlling pollution loads and improving water quality. The MOMAF of RO Korea has also included the TMDL process in their Plan of Action for the restoration of the Masan-Chinhae Bay.
- h) Many countries, particularly the developing ones, may have difficulties in adopting ecosystem-based management approaches and in implementing projects on environmental infrastructures and facilities due to limited funding and technical capabilities and expertise. The lack of interdisciplinary research efforts and technical expertise also constrained holistic understanding of ecosystem functions and processes.
- i) Organizational or legal arrangements for ecosystem-based management of coastal and marine areas should involve: (1) a multisectoral, inter-agency and multidisciplinary coordinating mechanism; (2) a cross-jurisdictional management authority linking upstream and down stream; and (3) application of adaptive management framework addressing scientific uncertainties.
- j) Shared vision and goals and a long-term management plan, strategies and programmes should be developed covering: (1) sustainable development of the area; (2) water pollution reduction; (3) habitat and living resources protection and restoration; (4) integrated land- and sea-use zoning; and (5) quality of life of community members.
- k) Adequate scientific support and advice should be provided to policy makers through: (1) inter-disciplinary research, monitoring and information management; (2) defining priority risks, critical habitats and allowable pollution load; (3) recommending specific strategies for pollution reduction, habitat protection/restoration, and land and water uses; and (4) clarifying roles and responsibilities of different stakeholders.
- l) Sustainable financing mechanisms should be in place, including business and investment plans addressing priority risks. Public-private partnerships should be promoted particularly to meet the widespread demands of secondary townships and communities for investment in

environmental projects. To facilitate this process, measures should be taken to develop transparent and incentive-based public policy, integrated and effective management systems, and revenue generating mechanisms based on polluter pays and user fees, etc., as well as community-based waste minimization programmes.

- m) Multi-stakeholders partnership arrangements should be facilitated to ensure: the participation of senior level decision makers; transparent decision-making; programme ownership by various stakeholders; coordination; and sharing knowledge, resources, expertise, benefits and risks.
- n) Continuous building of local capacity and upgrading technical expertise are critical. Sharing of innovative strategies and approaches, e.g. TMDL, and ecosystem-based governance, should be facilitated through the twinning arrangements. As countries have different levels of capacity in addressing the challenges in their marine ecosystems, scientific, technical and other means of support should be provided particularly to countries with limited capacities.
- o) In order to have a better understanding of the human impact and role on the ecosystem-based management, scientific and technical studies must be complemented with social science studies.

2.2 Session 2: Habitats and Living Resource Protection and Restoration

- 2.2.1 This session looked into the approaches and methods in restoring the depleted living resources, and the linkage of the restoration efforts with the management of living resource exploitation, water quality and wastes, as well as the lessons learned from the practices and recommendations for improvement.

Managing the Klang Coastal Wetlands in Malaysia

- 2.2.2 Mr. Murugadas Loganathan, Wetlands International, Malaysia, presented a case study of the ongoing efforts in the management of the Klang Coastal Wetlands, showing various wetland ecosystem functions and services, threats encountered and responses undertaken. The wetlands primarily serving as habitats for fish and flora and fauna, and protection from natural forces and flooding, etc., are facing strong pressure and threats posed by land reclamation, pollution, logging on mangroves and coastal erosion. One of the important instruments used in managing the area is the Klang Coastal Strategy developed within the framework of integrated coastal management (ICM) that provides guidance for the development and management of the wetlands. To effectively manage the Klang Wetlands, a holistic land use approach or a multiple land use planning framework that integrates wetlands is seen as an important step, however, before such framework can be established it is necessary to develop synergy among different levels of government. At the same time, appropriate stakeholders consultation and participation must be taken into consideration.

Practices in Restocking Depleted Fishing and Shellfish Species and Ecological Implication in the Yellow Sea and Bohai Sea

2.2.3 Dr. Jin Xianshi, Yellow Sea Fisheries Research Institute, PR China, presented a paper on the living resources in the Yellow Sea and Bohai Sea, giving special attention to the declining fish stocks and catch per unit of efforts, as well as measures taken to improve fisheries management, including banning motorized trawling along coastal waters, seasonal and area closure for major spawning grounds, licensing and mesh size limitation, etc. Chinese practices show that single species Total Allowable Catch (TAC) is not practical in enforcement. The government spends RMB 270 million each year to subsidize the scrapping of old fishing vessels and develop alternative livelihoods for the fishers, and strictly controls the construction of new fishing boats. Various resource enhancement and restoration measures have been taken in different locations, including the releasing of artificially hatched juvenile fishes, the juvenile of prawns and the ephyra of jellyfish. Cuttlefish enhancement is conducted by collecting eggs using cages and transferring them to waters suitable for fish growth. In addition, more than 100 species have been introduced from abroad for aquaculture. The ecological effects of the introduced species released and escaped from the control environment into natural habitats are not well monitored and evaluated. Ecosystem-based management is required as the introduced species from outside may have an impact on the natural balance in an ecosystem.

Development Challenges and Response Strategies: The Laguna de Bay Experience

2.2.4 Ms. Dolora Nepomuceno, Laguna Lake Development Authority, Philippines, considered the combination of scientific inputs and stakeholder participatory approaches as one of the key factors in the successful implementation of the projects in the development of the Laguna de Bay in the Philippines. Being the largest lake in the country, Laguna de Bay faces tremendous pressure brought about by rapid urban development and excessive use. In addition, coordination with various local government units, communities and industries in the area of the bay is an issue yet to be addressed. In order to manage the bay, the Philippine government has created the Laguna Lake Development Authority (LLDA), tasked to manage and coordinate the development of the lake. In general, the LLDA adopts a watershed-based, integrated and participative management system. The case of LLDA provided some innovative examples and strategies for bay management. In particular, two main projects have been established in the area: (a) Fishery Zoning and Management Plan (ZOMAP), and (b) Watershed co-management, under the Laguna de Bay Institutional Strengthening and Community Participation (LISCOP) Project. These projects have produced significant results and paved the way for increased awareness-building, stronger stakeholders cooperation and involvement, and reinforced partnerships.

Assessing Adverse Impact on Living Resources and Response Strategies in Jakarta Bay

- 2.2.5 Dr. Neviaty Zamani, Bogor Agricultural University, Indonesia, illustrated the interconnectivity among the Jakarta Bay, the Thousand Islands, and the effects of activities in the islands to the bay. In particular, she presented the deteriorating status of the mangroves, coral reefs, and the sea grass beds found in Jakarta Bay. A rapid assessment method taking into account the perspective of the community was carried out. From the assessment, it was concluded that pollution in the low land areas and the lack of or improper spatial planning in the upper land areas are the primary causes of the continuous degradation of Jakarta Bay. To minimize the threat in the bay, Dr. Zamani proposed two strategies and activities: (a) development of integrated river basin management in the context of ICM taking into consideration the principles of ecosystem-based management, and (b) development of coastal resources and ecosystem quality.

Habitat Conservation and Living Resource Management in the Seto Inland Sea of Japan

- 2.2.6 Dr. Osamu Matsuda, Hiroshima University, Japan, made a presentation on the Seto Inland Sea and the restoration methods and initiatives undertaken. The Seto Inland Sea is the largest enclosed coastal sea in Japan. The shallow area of the sea, including the tidal flat and seaweed or seagrass bed, serving as spawning and nursery ground, have been greatly affected by activities of land reclamation and other industrial development. As a result of the development activities in the area, living resource and fish catch have decreased. This has been attributed to effects of regime shift (large scale climatic and oceanographic changes), overfishing and destruction of spawning and nursing habitats. Various counter measures are needed to tackle the problems. However, the effects of regime shift are difficult to address in a short time. A new ecosystem health examination scheme has been proposed to take into account the ecosystem stability and smoothness of material cycling. New environmental policies have been created and new methods of restoration have been introduced to conserve and bring back the damaged shallow environment and habitat, such as total pollution load control, nutrient harvesting by algal biomass, eco-friendly protection walls, and restoration of upstream area. The concept of "Sato Umi" for managing Seto Inland Sea is emerging, which means harmonization of wise and sustainable uses with natural environment and habitat conditions in the coastal area.

Status and Historical Trend in the Accumulation of Toxic Chemicals in Masan-Chinhae Bay

- 2.2.7 Dr. Won-Joon Shim, Korea Ocean Research and Development Institute, RO Korea, presented the survey results of persistent organic pollutants in Masan-Chinhae Bay, one of the most extensively studied areas in Korea for its long history of contamination. Major contaminants include persistent, bioaccumulative and toxic pollutants such as polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), polynuclear aromatic hydrocarbons (PAHs), polybrominated dipheylethers (PBDEs), etc. Most of the target chemicals were detected in the Bay, and showed increasing gradient from outer to inner bay. The effluent outlet of sewage treatment plant

is one of the point sources for the identified contaminants. Vertical profile of some chemicals in the sediment cores provided valuable information on contamination history in the bay. The study results highlighted the usefulness of environmental risk assessment, suggesting that more specific management objectives should be defined in terms of specific organism, ecosystem structure, ecosystem functionality and/or biodiversity.

Ecosystem Modeling for Assessment of Pollution by Land-Based Sources in Masan-Chinhae Bay

2.2.8 Dr. Hyun-Taik Oh, National Fisheries and Research Development Institute, Ro Korea, considered the determination of the carrying capacity and target water quality as one of the important steps to sustainable management of coastal waters, estuaries and bays. Dr. Oh presented the results of assessing marine ecosystem response of Masan-Chinhae Bay to pollution reduction using a simulated physical-biological model. With the new construction and expansion of sewage treatment plant, a 50% reduction of nutrients input was targeted. The model predicted that the water quality in most of Masan-Chinhae Bay could be improved and could reach the second class water quality level except the inner part of the Bay that would still remain at the third class water quality level.

Ecological Regime Shift in the East China Sea Management Option

2.2.9 Dr. Shang Chen, the First Institute of Oceanography, PR China, introduced a recent study regarding the ecological regime shift or the shift of marine ecosystem state at decadal scale. In his view, this is one of the subject areas that can provide significant understanding on how marine populations respond to and are affected by variations in their environment. Trend analysis shows that regime shift does occur in the East China Sea (ECS). Sea surface temperature appears to have experienced the regime shift twice: from cold to cool in 1940 and from cool to warm regime in 1983. The ecological regime shifts have occurred three times since 1950, with the 1976-82 shift being the most significant. In 1959-78, the ECS kept Jack/Anchovy regime, while in 1978, it shifted to Sardine regime and kept it till 1997. Although the ECS is part of the Northwest Pacific, but its regime shift pattern is different from the Northwest Pacific, but similar to the Northeast Pacific. Based on the study, some fish stock decreasing trends may not be entirely due to overfishing or illegal fishing practices, but caused by changing biological and environmental factors. The ecological regime shift should be considered as an important factor in the management of marine ecosystems.

2.2.10 The following is the summary of the session:

- a. The coastal and marine environment and other interrelated water systems experience changes brought about by different and complex elements. Ecological regime shift, is one example of this complex and uncertain

occurrence that provides an explanation on the possible cause of fish stock depletion, a major issue in many management sites.

- b. The presentations identified human activities, overfishing and climate change, as some of the factors contributing to the depletion of fish resource. While very few studies have focused on the effect of climate change on fish stocks, it is believed that there is a possibility that climate change could cause considerable effect on some fish species. However, to make such a claim there is a need to conduct extensive studies to separate the effects of climate change and human activities. Some questioned the validity of data used in the regime shift study as presented in the workshop. Most cases of degradation still point to human activities as the major cause of the problem.
- c. Some sites, e.g., Bohai Sea, Yellow Sea, Laguna de Bay, have introduced new species and replenished fish stocks. This practice, though mostly done in a controlled environment, should be further studied and considered in terms of possible ecological implications and concerns.
- d. Gathering of data and assessment of the status of the ecosystem or water systems are crucial in the monitoring process. Gathering of time-series data will help facilitate monitoring activities and can make identification of possible counter measures easier.
- e. Ecosystem-based management entails a more holistic or broader view and scope. The problems encountered by Jakarta Bay and the Seto Inland Sea showed that for effective solutions to be realized, the root cause of the problems have to be identified and addressed. In both cases, it has been evident that activities in the upstream area must be taken into consideration as they affect the downstream area.
- f. Environmental concerns and concept of ecosystem-based management are not receiving high political priority. Putting the ecosystem-based approach to higher political level will help advance and strengthen the existing management approaches introduced in the sites.
- g. One of the major challenges identified is educating the people and national governments to encourage support on the implementation of ecosystem-based management strategies. In order to create harmony at all levels and to elevate the issue of environment as a national interest, public awareness needs to be promoted.
- h) Different areas possess different characteristics, problems and needs, therefore these areas have varying levels of development, or standards of management. Each country must set its own goals, targets and standards based on the carrying capacity of their environments. The Masan-Chinhae Bay and the Seto Inland Sea provide good examples as their environmental capacities are assessed as part of the planning process and strategies for development.

- i) In order to prevent possible negative implications of fish restocking in a marine ecosystem, the workshop recommended the development of indicators for restoration projects and the sustainable level of fishing resources.
- j) The phenomenon of ecological regime shift entails extensive studies. Such studies will help improve our knowledge of the impact of long-term and large-scale climatic changes on the variation of fish stocks in the oceans. Better understanding of ecological regime shifts can also enhance the understanding of coastal and marine ecosystems.
- k) The value of the shallow sea area as an ecosystem, where photosynthesis and respiration occur, deserves more attention and should further be studied.

2.3 Session 3: Coastal and Marine Water Pollution Prevention and Reduction

- 2.3.1 The session focused on the strategies and approaches to prevent, reduce and manage pollution, giving particular attention to the nutrient load, including lessons learned from the implementation of water management objectives, as well as land/ water use management programs. There were six presentations in this session:

Development and Implementation of Response Programme for the Coastal Strategy in the Manila Bay

- 2.3.2 Ms. Erlinda Gonzales, Manila Bay Environmental Management Project, DENR, Philippines, presented the action programmes developed and being implemented in support of implementing Manila Bay Coastal Strategy, particularly focusing on Operational Plan for the Manila Bay Coastal Strategy, Integrated Environmental Monitoring Program and water pollution reduction projects. The role of PEMSEA, particularly the opportunity that it provided to establish partnerships and assistance in introducing and setting-up integrative approaches in the bay's management, was also highlighted. To achieve the sustainable goals for the bay, several suggestions and recommendations were put forward: (1) the operationalization of the integrated watershed and coastal area management in Manila Bay, Laguna de Bay and Pasig River; (2) establishment of appropriate water quality criteria/standards for the Bay; (3) execution of sewage collection and treatment projects in selected urbanized areas; and (4) implementation of the recommendations set forth by the Refined Risk Assessment.

Nutrient Reduction and Management in Laizhou bay, Bohai Sea

- 2.3.3 Dr. Zhang Zhaohui, First Institute of Oceanography, SOA, China, discussed a case study on the nutrient reduction procedures and techniques adopted in Laizhou Bay in order to manage the eutrophication problem. The Laizhou Bay, one of the three main bays of the Bohai Sea, is one of the most important water body in China, as it is the major spawning and nursing

ground for the fishery resource of the Yellow Sea. However, the Laizhou Bay's water quality and resources are threatened due to increase of land-based pollutants brought about by industrialization, and economic development. This problem further magnified, resulting to eutrophication and harmful algal booms. Using the information gathered from a nutrient loads analysis, a nutrient management objective and principles were identified. Furthermore, in line with the objectives of protection and reduction of ecological damage, some modeling and calculation steps were conducted. These steps provided the necessary information in determining the suitable objectives for nutrient reduction for each sub-sector of the bay. The actual implementation would require setting up of collaborative mechanism among various concerned local governments and stakeholders; establishment of adequate scientific support and monitoring system; and effective supervision and public participation.

Pollution Prevention and Reduction Strategies and Implementation in the Jakarta Bay

2.3.4 Similar to other water systems, Jakarta Bay is also a victim of adverse impacts by rapid urbanization and poverty, non-point and point sources of pollution, depleted coastal resource and lack of institutional capacity. Dr. Zainal Arifin, Research Center for Oceanography, Jakarta, Indonesia, presented several measures, legislations and programs undertaken by the Ministry of Environment and other groups in order to protect and restore the bay, such as, the Clean River program, Clean Air program, Sustainable Coastal and Marine program and the 4-R (reduce, re-use, recover, recycle) program. To some degree, these programs have created changes and development in the bay, however, the lack of integrated management mechanisms, limited stakeholder's participation and weak institutional capability hinder significant improvement in the Jakarta Bay. Dr. Arifin suggested that proper cooperation and coordination among agencies, strengthening the role of communities, and promotion of awareness building measures should be undertaken in order to improve the status of the bay. Specifically, he suggested the formation of a monitoring network as well as the Jakarta Bay Management Board, as a mechanism for coordination among stakeholders and sectors.

Progress, Constraints and Future Direction in the Implementation of Pollutant Load Reduction Schemes in Japan

2.3.5 Mr. Mamoru Shigemoto, Ministry of Environment, Japan, made a presentation on the area-wide total pollutant load control system or program introduced in the Tokyo Bay, the Ise Bay, and the Seto Inland Sea. These three enclosed coastal sea areas have high concentration of population and industrial activities. Under the total pollutant load control system, the chemical oxygen demand or COD, nitrogen and phosphorus were the specified items to be controlled or reduced. In order to reach the target amount of reduction specified by the Ministry of Environment of Japan, three concrete measures were introduced: (a) development of household sewage treatment facilities, (b) the application of total amount control standards to industrial wastewater,

and (c) the provision of guidance for small scale and non-controlled industries and farmers and stock raisers. The measures taken have resulted to significant reduction of pollutants and development in the water quality. However, to ensure better results, continuous research, analysis and monitoring are being conducted in the three enclosed seas. Thus far, five total pollutant control program have already been undertaken, and as part of these efforts, the Ministry of Environment has created an expert committee and reviewed the results of the 5th total pollutant control system in 2004. As an outcome of the committee's discussion, the 6th pollutant load control program is expected to introduce a number of countermeasures to further improve the water environment of the three enclosed seas.

Variation of Harmful Algal Blooms in Masan-Chinhae Bay

- 2.3.6 In order to identify the pattern and causes of occurrence of algal blooms in Masan-Chinhae Bay, Dr. Chang-Kyu Lee, Marine Harmful Organisms Research Team, NFRDI, RO Korea, informed the workshop that a review of temporal variation and species succession were undertaken since 1981. The abundance of inorganic and organic nutrients in the bay leads to high productivity and frequent algal blooms. The temporal variation showed that different species dominate on different seasons and are affected by the variation in water temperature and salinity. Through this method, they were able to identify the algal species in the bay as well as predict their possible occurrence. The information gathered from this review serves as important guide in detecting and preparing for and even preventing rise of harmful algal blooms in the Masan-Chinhae Bay area.

Total Pollution Load Management System Implementation Strategies for the Water Quality Improvement of Masan-Chinhae Bay in Korea

- 2.3.7 Dr. Chang-Hee Lee, Environment Management Team, Korea Environment Institute, RO Korea, presented the framework and implementation scheme for applying "Total Pollution Load Management System(TPLMS)" in the coastal waters of Korea. The end-of-pipe water quality management approach, which has been traditionally employed in water quality management program, is limited in addressing the cumulative impacts of increasing load of total pollutants especially when pollutant sources are clustered together. Thus, Korea has introduced the TPLMS first to river basins. Building upon experiences and successful implementation in major river basins, the MOMAF is planning to apply TPLMS to managing coastal waters, and Masan-Chinhae Bay became the pilot site for this application. Dr. Lee presented the proposed implementation framework for TPLMS in Masan-Chinhae Bay, including water quality target, geographic scope, target pollutants, pollution types, responsible governments, planning period, enforcement measures, inspection and monitoring, and legal basis. He has also addressed critical technical issues related to identification of pollution sources, estimation of pollution load, operation of models, and estimation of maximum daily allowable load.

- 2.3.8 The following is the summary of the session:

- a. All the sites encounter sewage and nutrient problems. Jakarta Bay is one of the sites that has experienced severe sewage and nutrient problems. Although penalties and sanctions have been put in place, a number of people and companies still continue to violate. The government sometimes encounters difficulty in implementing sanctions as some restrictions result in conflict between government and companies. There are however reported cases whereby violators are penalized.
- b. Japan's experience in COD reduction entailed the installation of advanced technology and infrastructure, which may be too costly for some countries to undertake in a comprehensive manner. Alternatively, countries may opt for a staged approach, identifying priority concerns and areas to address problems of nitrogen, phosphorus and COD loading.
- c. Most of the problems and depletion of water systems are brought about by land-based activities. At present, land-based activities are managed by different institutions. Coordination among the institutions is seen as a critical factor in the proper management of the various coastal and marine ecosystems.
- d. Voluntary programs, as demonstrated in the Jakarta Bay and Manila Bay area, are considered to be examples of good practice. Participation of stakeholders from the community level helps in sustaining the programs and projects on coastal and marine ecosystem protection and development.
- e. Algal blooms and occurrence of red tide pose a grave threat to the marine ecosystem as well as to people dependent on this resource. The setting up of regular monitoring and early warning stations in RO Korea provides a good example to minimize, prevent and prepare for red tide occurrences. The National Fisheries Research and Development Institute (NFRDI) can provide good lessons and information on the subject.
- f. Effective monitoring system and information sharing are also important in the proper implementation of nutrient reduction schemes, as can be derived from the Bohai Sea Modeling System and the experiences of Japan.
- g. PEMSEA and other programmes and institutions need to consider joint efforts to help countries advance their capacities and programs in ecosystem-based management
- h. Crucial to the success of ecosystem-based management is the support from politicians and government, including local government units. Awareness building should be the integral part of the program to solicit stronger support from politicians.
- i. Information gathering and sharing should be encouraged and strengthened between and among the different sites so as to enhance their management capacities and properly address the concerns of interrelated water systems in the region.

- j. More information and discussion on other options for nutrient and pollution reduction should be encouraged and brought up in future workshops.

2.4 Session 4: Partnerships and Collaboration

2.4.1 This session aimed to provide a venue for the exploration of possible concepts and approaches in the networking of ecosystem-based management programme for coastal and marine areas, and to identify means of promoting knowledge management, information sharing and transfer. Group discussion was undertaken by the participants from Bohai Sea, Jakarta Bay, Manila Bay, Masan-Chinhae Bay and Seto Inland Sea with respect to the following questions:

- How to enhance the capacity in ecosystem-based management?
- What types of multidisciplinary research and analysis are needed?
- What should be the institutional arrangements at the site and regional levels?
- What and how the networking/twinning arrangements should be developed in promoting the ecosystem-based management?
- How to create an informed public?

Conveners of each group reported to the plenary of the workshop the results of the group discussion, as below.

2.4.2 The representative from Bohai Sea emphasized the need to include the socio-economic factors and problems in the future discussions and workshop on ecosystem-based management. He also stressed the need to establish multidisciplinary research and analysis to consolidate more comprehensive and holistic studies and to improve the understanding of the coastal and marine environment. In line with these proposed efforts, he emphasized that coordination between and among different agencies must also be promoted.

2.4.3 The representative from Jakarta Bay noted the need to promote interrelated sectoral capacity on the district and regional level. Some countries may not have sophisticated technologies to implement some of the newest methodologies particularly in pollution reduction, but this does not prevent them from exploring the applicability of techniques under their specific national capacities and conditions. To further develop their existing programs and capacities, efforts in awareness building or public information must be strengthened.

2.4.4 The representative from Manila Bay informed the workshop that they are currently looking into the integration of socio-economic concerns to ecosystem-based management. The exchange of expertise among institutions thru internship programs, exchange students/staff and study tour are some of the possible means suggested to promote awareness on coastal and marine management. Similar to the other sites, it is believed that the existing capacities of the Manila Bay and Laguna de Bay can be further

improved by more research works and by learning from the lessons and experiences of other more improved sites. To establish the first operating mechanisms of the twinning workshop, the representative from the Manila Bay proposed that focal agencies or key institutions be identified, but at the onset the PEMSEA Secretariat can provide a more coordinative role. The representative further expressed their willingness to forge partnerships with the other five twinning sites. The biggest challenge that they see is on how to close the gap between the scientists and experts and the public, at the same time how the significance of ecosystem-based management be inculcated in the minds of the public and government officials to ensure ownership and commitment to the programs related to ecosystem-based management.

- 2.4.5 For the part of the Masan-Chinhae Bay, the representative stressed that one way to establish bilateral and multilateral relations is by promoting local coastal network in the context of local Agenda 21.
- 2.4.6 The representative from Seto Inland Sea of Japan, recommended several innovative activities and ways to promote ecosystem-based management and collaboration among the sites. He suggested the production of practical manuals for indicators, monitoring and management scheme, the establishment of field sites, establishment of strong administration, and capacity building of specialists. Multidisciplinary researches have to be conducted on watershed management from land to sea movement, fishery resource management, socio-economic studies, etc. In consonance with the other sites, the representative from the Seto Inland Sea believes that proper coordination among different sectors and agencies have to be promoted. Even the activities from small scale projects can provide useful information and lessons to other sites and such information can be shared thru internet and other media. Putting of incentives to environment friendly activities is also seen as a means to attract attention and interest, and eventually help enhance the activities or programs on ecosystem-based management.

3.0 WORKSHOP CONCLUSIONS AND RECOMMENDATIONS

- i. The Workshop plenary discussed the reports of the group discussion and came up with the following conclusions and recommendations:

Networking and Twinning Arrangements

The Workshop noted:

- 3.1 With appreciation, the contribution and assistance of the MOMAF of RO Korea in the organization of the Workshop on Ecosystem-Based Management for Interrelated River Basins, Estuaries and Coastal Seas;
- 3.2 With appreciation, the RO Korea's willingness to host and fund the Twinning Secretariat as part of PEMSEA Resource Facility;

- 3.3 The importance of establishing twinning sites and relationships in order to effectively address the transboundary problems and issues besetting the interrelated water systems of the region;
- 3.4 That the concept of twinning may include both bilateral and multilateral partnership arrangements between or among the sites depending on their interests and needs. This will enable countries and groups with different capacities to work together on an equitable basis thereby promoting stronger coordination and communication.

The Workshop recommended:

- 3.5 The establishment of the Bohai Sea, Jakarta Bay, Manila Bay, Masan-Chinhae Bay, Chesapeake Bay, and Jakarta Bay as the core sites for the Twinning Arrangements;
- 3.6 The development of twinning relationships between and among sites based on common methodology, approaches, capacity building, cooperative and interdisciplinary research, and information sharing;
- 3.7 To widen the scope of twinning arrangements, establish twinning relationships between institutions/organizations, local governments, and civil society;
- 3.8 That regional task forces composed of professionals or experts from the participating sites be organized to take a lead role in the activities of a given task force;
- 3.9 The establishment of a twinning secretariat on ecosystem-based management to facilitate and coordinate the activities and developments in collaboration with twinning sites and arrangements, e.g., joint research, study tour, staff exchange, and organization of workshops.

Capacity building

The Workshop noted:

- 3.10 The need to conduct capacity building measures to increase the understanding and appreciation of the concept of ecosystem-based management;
- 3.11 That gathering and compiling of the lessons learned and good practices in different sites will help other countries in strengthening their programs and initiatives;
- 3.12 That some sites do not have the necessary knowledge, infrastructure, and funding to implement modern and sophisticated processes to address pollution, depletion of fish stocks, and other problems that cause the deterioration of coastal and marine management.

The Workshop recommended:

- 3.13 The strengthening of ecosystem-based management concept and practices by compiling case studies and lessons learned for different sites, publication or development of a handbook of good practices, training manual, and other research or studies;
- 3.14 The conduct of study tours and exchange programs to deepen the knowledge and capacity on ecosystem-based management;
- 3.15 To undertake trainings and workshops on ecosystem-based management including the latest innovations or processes on ecosystem-based management to produce sound and effective strategies in managing the coastal and marine ecosystems;
- 3.16 That the twinning arrangements start from the training of core staff for all the participating sites in the concept, approaches and practices of the coastal and marine ecosystem-based management. This training is necessary not only for the policy makers and core staff, but also for scientists and other professionals;
- 3.17 That future cross-site twinning arrangements consider the following areas: total pollution load management system, living resource restoration and management, ecosystem monitoring and analysis, market-based instruments for pollution reduction and resource conservation, and the application of ecosystem-based management approach in coastal and marine governance.

Research and Analysis

The Workshop noted:

- 3.18 That various studies and data related to coastal and marine protection and management are not readily accessible and shared;
- 3.19 That there is a considerable lack of multidisciplinary research/studies related to ecosystem-based management;
- 3.20 That most research and analysis on coastal and marine ecosystem-based management are focused on technical and scientific aspects and very little on the socio-economic aspects.

The Workshop recommended:

- 3.21 That future workshops include discussions on the socio-economic aspects of ecosystem-based management, considering in particular the value of the coastal and marine resources and environment to national and regional economies;

- 3.22 The development of multidisciplinary researches on various aspects of ecosystem-based management and packaging of guidelines, manuals and reference materials for dissemination and facilitating the training efforts, particularly concerning the approaches and practices of:
- Application of ecosystem-based governance in coastal and marine areas
 - Total pollution load management and total maximum daily load
 - Assessment and management of species introduction in living resource restoration and enhancement
 - Diversified financing options and mechanism and investment promotion for environmental improvement projects and sustainable resource uses
- 3.23 The creation of common or standardized methodologies, approaches, indicators and standards to assess coastal and marine ecosystems/habitats, monitor changes and develop necessary counter measures.

Institutional Arrangements

The Workshop noted:

- 3.24 The benefits of stakeholder participatory management mechanisms and programmes, and effective enforcement and monitoring of programme activities, as most of the national institutions or agencies involved in coastal and marine management are still sectoral in nature, mostly undertaking sometimes conflicting, overlapping and redundant tasks and activities;
- 3.25 The lack of interagency coordination, and lack of shared vision and goals in the implementation of ecosystem related projects and policies resulting to weak implementation of policies related to the conservation and protection of coastal and marine resources and environment.

The Workshop recommended:

- 3.26 The development of a multisector, multidisciplinary and interagency mechanism to focus on the development and implementation of integrated coastal and marine ecosystem-based management policies and programmes; and to strengthen coordination between and among different institutional arrangements at the site, national and regional levels;
- 3.27 Engaging stakeholders to form part of the network for promoting ecosystem-based management.

Public Awareness and Participation

The Workshop noted:

- 3.28 That ecosystem-based management thus far is not yet considered as a priority in many national agenda. Awareness building and public participation

must be promoted to elevate the political interest and appreciation of ecosystem-based management;

- 3.29 The initiatives and good practices demonstrated in some sites, particularly in encouraging volunteerism and community involvement in coastal and marine conservation efforts and exercises;
- 3.30 The need to provide venues and means to display and access data or information related to coastal and marine ecosystem-based management;
- 3.31 The benefits/advantages of providing incentives to environment-related initiatives and efforts.

The Workshop recommended:

- 3.32 The promotion of awareness building measures and participatory activities in order to create an informed public;
- 3.33 The strengthening of linkages between sites by creating a common website for the twinning activities. The website may also serve as a medium for posting of data and other studies on ecosystem-based management. Other forms of media can also be utilized for information dissemination.

Other Future Activities

The Workshop recommended:

- 3.34 The inclusion of the Twinning Workshop and its related activities as one of the new projects or initiatives in the follow-on phase of PEMSEA;
- 3.35 The organization of the second twinning workshop as part of the East Asian Seas Congress 2006 in Hainan, China;
- 3.36 The submission of the Workshop conclusions and recommendations to the PEMSEA Programme Steering Committee Meetings for consideration;
- 3.37 Reporting the Workshop results, including conclusions and recommendations to the concerned national and site agencies, institutions and programmes for consideration.

4.0 CLOSING CEREMONY

- 4.1 On behalf of the Ministry of Maritime Affairs and Fisheries of RO Korea, Mr. Keon Soo Sohn expressed his gratitude to PEMSEA and to all the workshop participants. Mr. Sohn reiterated MOMAF and RO Korea's support to further strengthen the collaboration and interaction among different coastal and marine ecosystems in the region. He also reaffirmed the MOMAF's willingness to serve as the Secretariat for the Twinning Arrangements. Finally,

he wished everyone a safe journey home and looks forward to the next twinning workshop.

- 4.2 Dr. Chua Thia-Eng, thanked the MOMAF of RO Korea for their strong support in PEMSEA and in co-organizing the Twinning Workshop. He also acknowledged the assistance and contribution of the Korea Maritime Institute, KORDI, Kyungnam University and the National Fisheries Research and Development Institute in the successful conduct of the workshop and for hosting some of the meals of the participants. He expressed his hope for stronger collaboration and twinning arrangements in the future. The RPD officially closed the ceremony by inviting everyone to the East Asian Seas Congress 2006.

ANNEX 1
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ANNEX 2
WORKSHOP PROGRAMME

Workshop on Ecosystem-Based Management of Interrelated River Basins, Estuaries and Coastal Seas

Wednesday, 01 June 2005

09:00 – 09:30 **Registration**

09:30 – 10:00 **Opening Ceremony**

Opening Remarks:

Mr. Lee, Yong Woo
Deputy Minister
MOMAF

Dr. Chua Thia-Eng
Regional Programme Director
PEMSEA

Congratulatory Remarks:

Mr. Hwang, Chul Gon
Mayor of Masan City

Dr. Koh, Hyun Wook
Vice President of Kyungnam
University

Dr. Chin, Hyung In
Acting President of KMI

10:00 – 10:15 **Keynote Address**

Keynote Speaker:

Dr. Je, Jong Geel
National Congressman
Republic of Korea

10:15 – 10:25 **Photo Session**

10:25 – 10:45 Tea/Coffee Break

10:45 – 11:15 **Presentation on Workshop Background Paper**

**Ecosystem-Based Management of Interrelated River Basins,
Estuaries and Coastal Seas: From Concept to Practice**

Dr. Huming Yu, Senior Programme Officer, PEMSEA

**Session 1: Policy Direction for Ecosystem-Based
Management of Coastal and Marine Areas**

Chair:

Prof. Lee, Chan Won
Kyungnam Univ.

Facilitator: Dr. Jihyun Lee
Senior Programme Officer
PEMSEA

- 11:15 – 11:40 **RO Korea’s Policies and Practices in Managing Coastal and Marine Ecosystems**
Mr. Keon-Soo Sohn, Marine Environment Division, MOMAF
- 11:40 – 12:00 **Strategies and Perspective on the Coastal Environment Management of Masan-Chinhae Bay**
Dr. Dae-Seok Kang, et al., Pukyung Univ.
- 12:00 – 13:30 Lunch
- 13:30 – 13:50 **Experiences and Lessons Learned Through the Implementation of National Legislation for the Seto Inland Sea**
Mr. Jiro Eiho, Water Environment Division, Hyogo Prefecture Government, Japan
- 13:50 – 14:10 **Policy Challenges in Governing Complex Coastal System: Application of Strategic Planning Approach to the Case of the Jakarta Bay, Indonesia**
Dr. Luky Adrianto, Center for Coastal and Marine Resources Studies, Institute for Tropical Coastal and Ocean, Bogor Agricultural University, Indonesia
- 14:10 – 14:30 **A Legal Framework and Implementing Mechanisms for the Integrated Management of the Bohai Sea**
Dr. Liu Yan, China Institute for Marine Affairs, State Oceanic Administration, Beijing, PR China
- 14:30 – 14:50 **Manila Bay Project as a Case Study on Inter-agency and Multi-disciplinary Approach for Policy Development and Implementation of Coastal Management in the Philippines**
Mr. Robert Jara, Bilateral Investment and Programme Division, FASPO, Department of Environment and Natural Resources, Philippines
- 14:50 – 15:10 **Developing Intergovernmental Arrangements and Stakeholder Partnerships in Managing the Chesapeake Bay Environment**
Dr. Huming Yu, Senior Programme Officer, PEMSEA

15:10 – 15:40	<p>Panel Discussion and Session Conclusion</p> <p>Panelists: Dr. Zainal Arifin Researcher Research Center for Oceanography Jakarta, Indonesia</p> <p> Dr. Jihyun Lee Senior Programme Officer PEMSEA</p>
15:40 – 15:55	<p>Coffee/Tea Break</p> <p>Session 2: Habitats and Living Resource Protection and Restoration</p> <p>Chair: Mr. Robert S. Jara Division Chief, Bilateral Investment and Program Division, FASPO DENR, Philippines</p> <p>Facilitator: Dr. Huming Yu Senior Programme Officer PEMSEA</p>
15:55 – 16:20	<p>Managing the Klang Coastal Wetlands, Malaysia Dr. Murugadas Loganathan, Wetlands International, Malaysia</p>
16:20 – 16:40	<p>Practices in Restocking Depleted Fishing and Shellfish Species and Ecological Implication in the Yellow Sea and Bohai Sea Dr. Jin Xianshi, Yellow Sea Fisheries Research Institute, China</p>
16:40 – 17:00	<p>Development Challenges and Response Strategies: The Laguna de Bay Experience Ms. Dolora Nepomuceno, Laguna Lake Development Authority and World Bank Assisted projects, Philippines</p>
17:00 – 17:20	<p>Assessing Adverse Impact on Living Resources and Response Strategies in Jakarta Bay Dr. Neviaty Zamani, Center for Coastal and marine Resources Studies Institute for Tropical Coastal and Ocean, Bogor Agricultural University, Indonesia</p>
17:20 – 17:40	<p>Habitat Conservation and Living Resource Management in the Seto Inland Sea, Japan Dr. Osamu Matsuda, Hiroshima University, Japan</p>

Thursday, 02 June 2005

09:00 – 09:20

Status and Historical Trend in the Accumulation of Toxic Chemicals in Masan-Chinhae Bay

Dr. Won-Joon Shim, Southern Coastal environment Research Division, Korea Ocean Research and Development Institute

09:20 – 09:40

Ecosystem Modeling for Assessment of Pollution by Land Based Sources in Masan-Chinhae Bay

Dr. Hyun-Taik Oh, Marine Environment Management Team, national Fisheries Research and Development Institute

09:40 – 10:00

Ecological Regime Shift in the East China Sea Management Option

Dr. Shang Chen, First institute of Oceanography, State Oceanic Administration

10:00 – 10:30 **Panel Discussion and Session Conclusion**

Panelists:

Dr. Huming Yu
Senior Programme Officer
PEMSEA

Mr. Mamoru Shigemoto
Deputy Director
Office of Environmental Management of
Enclosed Coastal Seas
Water Environment Department
Ministry of Environment, Japan

10:30 – 10:50 Coffee/Tea Break

Session 3: Coastal and Marine Water Pollution Prevention and Reduction

Chair:

Mr. Jae-Ryong Oh
Head
APEC Marine Environment Training &
Education Center
Korea Ocean Research & Development
Institute

Facilitator:

Dr. Jihyun Lee
Senior Programme Officer
PEMSEA

- 10:50 – 11:10 **Development and Implementation of Response Programme for the Coastal Strategy in the Manila Bay**
Ms. Erlinda A. Gonzales, Manila Bay Environmental Management Project, Environmental Management Bureau, DENR, Philippines
- 11:10 – 11:30 **Nutrient Reduction and Management in Laizhou Bay, Bohai Sea**
Dr. Zhang Zhaohui, First Institute of oceanography, State oceanic Administration, China
- 11:30 – 11:50 **Pollution Prevention and Reduction Strategies and Implementation in the Jakarta Bay**
Dr. Zainal Arifin, Research Center for Oceanography, Jakarta, Indonesia
- 11:50 – 13:30 Lunch
- 13:30 – 13:50 **Progress, Constraints and Future Direction in the Implementation of Pollutant Load Reduction Schemes in Japan**
Mr. Mamoru Shigemoto, Environmental Management Bureau, Ministry of the Environment, Japan
- 13:50 – 14:20 **Variation of Harmful Algal Blooms in Masan-Chinhae Bay**
Dr. Chang-Kyu Lee, Marine Harmful Organisms Research Team, National Fisheries Research & Development Institute
- 14:20 – 14:50 **Total Pollution Load Management System Implementation Strategies for the Water Quality Improvement of Masan-Chinhae Bay in Korea**
Dr. Chang-Hee Lee, Environment Management Team, Policy Research Division, Korea Environment Institute
- 14:50 – 15:20 **Panel Discussion and Session Conclusion**
- Panelists:
- Dr. Jin Xianshi
Senior Scientist
Yellow Sea Fisheries Research Institute
Qingdao, PR China
- Dr. Park Jong Soo
National Fisheries Research &
Development Institute
RO Korea
- 15:20 – 15:50 Coffee/Tea Break

15:50 – 16:50

Session 4: Partnerships and Collaboration

Chair: Dr. Chua Thia-Eng
Regional Programme Director
PEMSEA

Facilitator: Dr. Huming Yu
Senior Programme officer
PEMSEA

Panel Discussion

Site Representatives: Bohai Sea
Jakarta Bay
Manila Bay
Masan-Chinhae Bay
Seto Inland Sea
PEMSEA

16:50 – 17:20

Open Forum

17:20 – 17:30

Closing Ceremony

Closing Remarks: Mr. Keon-Soo Sohn
Director
Marine Environment Division
Ministry of Maritime Affairs and Fisheries
RO Korea

Dr. Chua Thia-Eng
Regional Programme Director
PEMSEA

Friday, 03 June 2005

Field Excursion

National Fisheries Research and
Development Institute and Busan City tour

ANNEX 3
FULL TEXT OF SPEECHES
OPENING CEREMONY

**Welcome Remarks of Dr. Chua Thia-Eng
Regional Programme Director, PEMSEA**

Hon. Dr. Je Jong Geel, National Congressman

Hon. Mr. Lee Yong Woo, Deputy Minister of MOMAF

Hon. Mr. Hwang Chul Gon, Mayor of Masan City

Dr. Chin Hyung In, distinguished President of Korea Maritime Institute,

Dr. Ko Hyun Wook, distinguished Vice President of Kyungnam University

Representatives of Kyungnam Province

Delegates from Bohai Sea, Jakarta Bay, Manila Bay and Seto Inland Sea

Ladies and gentlemen

On behalf of PEMSEA, I wish to welcome all the participants and guests to this workshop. We thank MOMAF for choosing Masan City as the site for this workshop not only because it is a beautiful coastal city but also of its important relationship with the Masan-Chinhae Bay, a coastal sea of significant socioeconomic and environmental importance, which I had the opportunity to visit many years ago.

I am particularly pleased and thankful to Deputy Minister Mr. Lee Young Woo and Congressman Dr. Je Jong Geel for gracing this occasion with their presence. I have special respect for both of them for their pioneering role in building up a strong PEMSEA- MOMAF/ ROK relationship. Mr. Lee and I signed a Memorandum of Arrangement on September 20, 2002 that resulted in a close working relationship between MOMAF and PEMSEA. Under the general framework of the Memorandum, we were able to benefit from the expertise of Dr. Je Jong Geel who was instrumental to the development and implementation of the Shihwa Lake as PEMSEA's first integrated coastal management (ICM) parallel site. Although very much belated, we wish to congratulate Dr. Je for being elected as Congressman and we wish that he will champion the course of sustainable development for our coastal and marine areas to his National Legislative Assembly.

Ecosystem-based management for watershed, estuaries and coastal seas is one of the future areas of concern of the follow-on phase of PEMSEA which is expected to begin in 2007. The needs and benefits of integrated management approach have been

demonstrated during the current phase of PEMSEA through the implementation of ICM projects at local level and risk assessment and management of the subregional seas. It is an opportune time to consider a more complete ecosystem-based management approach by considering watershed/ river-basin, estuaries and the adjacent coastal seas as one complex ecosystem that should be managed in its entirety. This will enable us to consider environmental management issues arising from the hill-top to the sea.

Considerable ecosystem-based or environmental management experience has already been acquired in several larger ecosystems, such as the Chesapeake Bay of the United States, Seto Inland Sea of Japan, Manila Bay of the Philippines, Bohai Sea of China, Jakarta Bay in Indonesia and many other ecosystems in other parts of the world. There is an added value to the management approach if these experiences are being shared regularly and twinning relationship between these areas are formalized to ensure a long term working relation that enable regular sharing of experience and knowledge as well as helping each other in strengthening their own management initiatives. On this note, I am sure the inclusion of Masan-Chinhae Bay would contribute largely to this initiative. The research that has been undertaken in the Masan-Chinhae Bay would certainly add value to the regional efforts.

During the process of developing the project concept and activities, we are very pleased that MOMAF has taken the initiative to cooperate with PEMSEA in organizing this workshop in order to explore and develop this concept into a project proposal that could be integrated into the overall project document of the follow-on phase of PEMSEA.

I am pleased to inform you that PEMSEA's concept proposal for the follow-on phase has just been approved by the GEF. This means that the outputs of this workshop can be considered for inclusion in the final project document.

As you are aware, PEMSEA has initiated the development and adoption by the participating governments of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), which represents the first regional implementation of the WSSD Plan of Implementation. GEF and World Bank have agreed, in collaboration with PEMSEA, to invest in the implementation of the SDS-SEA and have allocated USD 80 million to help the region in undertaking environmental improvement projects towards reducing nutrient

reductions in the seas of East Asia. PEMSEA's participating countries are also actively considering the financing of a long-term regional secretariat to coordinate the implementation of the SDS-SEA by the countries.

The purpose of this workshop therefore is to advance the concept of ecosystem-based management and its application in the major ecosystems in selected sites as well as to explore how the participating sites could strengthen linkages or establish twinning relationship in strengthening capacity, building advocacy, undertaking joint research and establishing sister cities. I hope through this workshop, you will be able to recommend appropriate approaches and workable activities that could be considered for future collaborations.

The challenge ahead of us, however, is how to turn the concept of ecosystem-based management into actions. It is now well established internationally that the sustainable use and development of the natural resources must be undertaken within an integrated ecosystem-based management framework and should deeply involve the stakeholders. Ecosystem-based management applies the same technique and approach as ICM but with greater emphasis on the interactions between the ecosystems and human beings. The inclusion of human being as part of the ecosystem has been a target of debate for years, but we are very clear that we cannot achieve sustainable use of the ecosystem if human element is not included into the management consideration.

The challenges to ecosystem-based management are that of the uncertainties of how an ecosystem is responding to human interventions as well as that of human responses to environmental changes. These uncertainties require therefore a holistic but adaptive management approach. These formidable challenges require the expertise and skills of scientists and technologists, the management skills of the economic and environmental managers but, more importantly, the wisdom and commitment of the political leaders.

I would like to take this opportunity to thank MOMAF again for hosting this workshop and the support it has provided to the participants. We also look forward for future collaboration with MOMAF in advancing recommendations of this workshop into a longer term, target specific collaborative programme under the follow-on phase of PEMSEA.

Finally, let me take this opportunity to thank the staff of MOMAF and those of PEMSEA and all those who have helped in putting this workshop together. I look forward to a successful and fruitful meeting.

Thank you and good morning.

**Keynote Address of Dr. Je Jong Geel
National Congressman, Republic of Korea**

Honorable Deputy Minister of Ministry of Maritime Affairs and Fisheries

Honorable Mayor of Masan City

Distinguished President of Korea Maritime Institute

Distinguished Regional Programme Director of PEMSEA

Distinguished Vice President of Kyungnam University

Distinguished Representatives of Kyungnam Province

Distinguished Delegates from Bohai Sea, Jakarta Bay, Manila Bay and Seto Inland Sea,
Ladies and Gentlemen

Good Morning!

It is indeed my great pleasure to deliver a keynote address for this important workshop. I would like to first congratulate Ministry of Maritime Affairs and Fisheries and PEMSEA for their successful endeavors in collaborating on this important topic together with representatives from other coastal areas in the East Asian Seas Region.

As a person who has been involved in the scientific research and management of coastal ecosystems for the past two decades before joining the National Congress, I am happy to have this opportunity to share my experiences and views on our common challenging task of coastal and marine ecosystem-based management.

There is an increased awareness that ecosystem-based management represents an innovative approach in reforming our governance over environment and natural resources, including those in coastal and marine areas. Therefore, this workshop represents a serious effort in the East Asian Seas region to bring the topic of coastal and marine ecosystem-based management on our working agenda in a timely manner.

From the title of the workshop, the ecosystem, we will focus on in the next few days, is the interrelated river basins, estuaries and coastal seas. The issue to be addressed by the workshop is how to manage such an ecosystem for the sustainable development goal. I believe that the workshop can achieve its objective through the sharing of

experiences and lessons learned and find out future direction particularly through cooperation and partnership building among us.

Ecosystem-Based Management for Sustainable Development

Managing ecosystems requires a unique holistic approach. An ecosystem-based approach takes into account how people's use of ecosystems affects their productivity and functioning.

According to World Resources 2000-2001 report, an ecosystem-based approach is an integrated approach which considers the entire range of possible goods and services available from ecosystems and optimizes them in order to make trade-offs efficient, transparent and sustainable.

The ecosystem-based management takes the long term view and respects ecosystem processes at the micro level but sees them in the larger context of landscapes and decades. The framework of ecosystem-based management must therefore be flexible in order to adapt to continually changing situations and conditions.

Ecosystem concept is born within the sustainable development concept. In other words, sustainable development calls for ecosystem-based management.

The concept of sustainable development as espoused in the Brundtland Report in 1987, also known as the book *Our Common Future*, clearly says that our natural heritage of flora and fauna must be preserved, where possible, enhanced, and handed on to the next generations who shall take care of it.

The World Summit on Sustainable Development (WSSD) held in 2002 brought the highest level of representatives from governments, UN agencies, civil society organizations, businesses and multilateral financial institutions to review the global changes and the achievements that have been made since the 1992 Rio Summit. WSSD Plan of Implementation contains a specific reference of "encouraging application of ecosystem-based approach by 2010".

Ecosystem-Based Management in International Conventions

The central concept of the ecosystem-based approach to management is the integration and removal of artificial barriers between economics, social science and ecology, and places humans squarely within the ecosystem framework. This is needed to achieve a socially acceptable balance between conservation, resource use and sharing of benefits.

The 1980 Convention on the Conservation of Atlantic and Marine Living Resources was considered as the first application of the ecosystem-based approach in international convention. The approach recognized the importance of ecological interactions between and within fish populations, between fish and other species, and between biota and their physical and chemical environments. This initiative set out to minimize or completely avoid the potential adverse effects of fishing on other fish species on the marine ecosystem as a whole to ensure the sustainability of the fisheries.

The Convention on Biological Diversity (CBD), signed by 154 governments at the UNCED, has the main objective to conserve biological species, genetic resources, habitats and ecosystems; to ensure the sustainable use of biological materials; and to guarantee the fair and equitable sharing of benefits derived from genetic resources.

Efforts toward Ecosystem-Based Management in the Seas of East Asia

Among various regional initiatives toward ecosystem-based management, I would like to highlight some of the key achievements.

In the First APEC Ocean-related Ministerial Meeting in Seoul, Korea, on April 2002, the Seoul Oceans Declaration was born and adopted. It aims to promote better coastal and oceans management across the 21 APEC economies in an integrated manner using an ecosystem-based approach. This includes sub-regional seas, river basins, and watersheds adjacent to coastal areas. It also promotes increased stakeholder participation including the private sector, NGOs and academe.

PEMSEA's Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), adopted through Putrajaya Declaration by the Ministerial Forum of the East Asian Seas

Congress in 2003 is one of the most important regional initiatives to date for the region's sustainable development and ecosystem-based management efforts. The SDS-SEA specifically stipulates that "ecosystem-based management approaches shall be applied to ensure sustainable development of coastal and marine areas" as one of the general principles to which it subscribes.

Efforts toward Ecosystem-Based Management in the Republic of Korea

Since the creation of integrated ocean governance, Ministry of Maritime Affairs and Fisheries, Korean government has strengthened institutional and legal framework for adopting the principles of sustainable development as well as ecosystem-based management approaches in managing the coasts and the seas. Key examples include the enactment of Coastal Management Act and Wetland Conservation Act in 1999, amendment of Marine Pollution Prevention Act in 1999, and the on-going efforts to enact "Marine Ecosystem Protection and Management Act" and "Marine Environment Management Act".

In particular, the Marine Ecosystem Protection and Management Act will provide a firm ground for the followings:

- Reducing overfishing and protect biodiversity by designating marine protected area;
- Maintaining healthy ecosystem and primary production by conducting systematic research of marine ecosystem components and protecting migratory marine animals;
- Formulating a long-term marine ecosystem protection and management plan based on regular ecosystem survey; and
- Establishing "marine ecosystem conservation fund" to support various efforts toward the sustainability of marine ecosystem.

The sustainability goal of marine ecosystem cannot be achieved by single agency efforts. It requires collective and systematic efforts and partnership approaches by various stakeholders including relevant national and local governments, community members, private sectors, NGOs and other civil society groups. In case of Korea, in particular, it

requires wise partnership approach between Ministry of Maritime Affairs and Fisheries and Ministry of Environment, which are two key national agencies involved in managing land and marine environment.

During MOMAF's report to the President recently held in March, our president, Mr. Roh Moo Hyun, emphasized the critical need for adopting integrated approaches linking land and sea to address threats to marine ecosystem. Masan-Chinhae Bay thus became a testing ground for practicing integrated ecosystem-based management approaches as well as managing the pollution input by total quantity through the collaboration among MOMAF, MOE and relevant local governments and stakeholders.

Observing the efforts by key national agencies, however, I am a bit concerned that integrated management is being practiced only by law, not by the vision or the heart of those concerned people. If those key agencies are only concerned about protecting their own authority and administrative resources instead of making efforts to work together with different stakeholders, the integrated ecosystem-based management would become a goal that we can never achieve.

In this regard, I would like to alarm the bell to all those concerned in the management of Masan-Chinhae Bay calling for their sincere efforts to open their mind and work together to make changes on-ground.

Distinguished delegates and participants,

Masan-Chinhae Bay, where we gather today, used to be a place of public pleasure for swimming and fishing. I am sure our colleagues from Bohai Sea, Jakarta Bay, Manila Bay and Seto Inland Sea have been experiencing similar challenges that we are facing now in Masan-Chinhae Bay.

To further strengthen our existing efforts to restore the water quality and ecosystem of Masan-Chinhae Bay, we need your wisdom and collective efforts. Our experiences in this Bay, I believe, would also become useful lessons to enhance your efforts in your respective coastal areas. In this respect, I highly appreciate the collaborative efforts of MOMAF and PEMSEA in linking and twinning various coastal ecosystems in a regional network to collectively enhance the regional efforts towards the integrated ecosystem-based management of river basins, estuaries and coastal areas.

As a scientist as well as a politician working at the national congress, I would like to also express my sincere commitments to bring your messages to relevant policy making forums and increase awareness of political communities on the need for ecosystem-based management.

Finally, I hope you enjoy your stay in Korea, and my best wishes for the successful and fruitful discussion for the next few days.

Thank you for your attention.

ANNEX 4
WORKSHOP BACKGROUND PAPER

BACKGROUND PAPER

PEMSEA'S INITIATIVE IN ECOSYSTEM-BASED MANAGEMENT FOR INTERRELATED RIVER BASINS, ESTUARIES AND COASTAL SEAS

*Huming Yu,
Senior Programme Officer, PEMSEA*

Introduction

The Seas of East Asia consist of 5 Large Marine Ecosystems (LMEs), namely the Yellow Sea, East China Sea, South China Sea, Sulu-Celebes Sea and the Indonesian Seas. The Seas of East Asia support 30% of the world's coral reefs and mangroves, and produces 40% of the world's marine fish and 80% of the world's aquaculture. The health of the LMEs is strongly influenced by the inputs coming from the vast expanse of its adjacent river basins, covering an area of over 6 million km², with a population of more than 1.4 billion people, about 74% of the total population in the East Asian Seas countries (1.95 billion). The coastal lands and waters are the interactive zone of the river basins and the LMEs, covering a variety of ecosystems and habitats, such as estuaries, wetlands (including mangroves), coral reefs, sea-grass beds, and fishing spawning and nursery areas. The coastal area, although occupying a limited portion of land areas in the countries of the region, provides shelters for some 900 million people (residing within 100 km of the coast), about 50% of the total population in these countries. It plays a leading role in national social and economic growth, but bears the brunt of ecological and socioeconomic consequences of the rapid growth.

Recent findings show that, at the current rate of ecological degradation, the region's coral reefs face total collapse within 20 years, while mangroves could be gone within 30 years. About 515 million people in the region are without access to proper sanitation services and thus placed at high risk of sewage-related diseases and death due to untreated wastewater emissions. It is estimated that at present only 11 percent of domestic sewage is treated, and billions of tons of industrial wastewater are being discharged from major coastal cities without pre-treatment. Another 10 million tons of fertilizers are used annually in watershed areas, adding to the already excessive nutrient loading to receiving rivers, lakes, ground waters and marine waters. Consequently, harmful algal bloom events covering thousands of square kilometers are increasingly observed, damaging living resources, disrupting ecosystem stability and threatening human health. The worsening of the region's environmental and natural resource integrity has ramifications not only for the inhabitants of East Asia, but also for user States and other global beneficiaries of the region's marine and coastal resources and waterways.

The countries of the region, in creating economic miracle of modern time, are also suffering from the consequences of unsustainable development when the rapid growth can not be maintained over time by resource base and capacity. This was reflected by the 1997 financial crises in the region which has a global impact. The countries of the region have been repeatedly reminded on the need to protect the environmental health and the sustainability in resource uses when they battle against SARS, bird flu, typhoon and tsunami. Very often many long term and severe ecological consequences are not readily detectable and as such they do not make the headlines.

Why Ecosystem-Based Management?

To arrest the trend of ecological degradation in the Seas of East Asia, efforts have been made to address some major concerns relating to:

- River basins, e.g., Mekong River
- Coastal areas, e.g., PEMSEA and other ICM initiatives
- LMEs, e.g., Yellow Sea LME
- Pollution by land based sources, e.g., COBSEA, GPA/LBA
- Pollution by sea based sources, e.g., IMO conventions, GloBallast
- Habitats, e.g., UNEP/GEF South China Sea project
- Biodiversity, e.g., MPAs sponsored by national and international organizations
- Sustainable use of living resources, e.g., FAO Code of Conduct for Sustainable Fisheries, EAPEI
- Investments and financing, e.g., Strategic Partnership for a Land-Based Pollution Reduction Investment Fund for the LMEs of East Asia

Despite the management efforts made, degradation continues in many places. This prompts innovative thinking for better management framework, strategies and approaches. A challenging issue for the management is that the problems we face are diversified in scale and interconnected in causality, while our management approaches are often taken from discrete sectoral, disciplinary, and departmental interests and perspectives, which would lead to misallocation and inappropriate use of the limited resources and capacity.

The WSSD Plan of Implementation and its regional implementation platform for the coasts and oceans, i.e., Sustainable Development Strategy for the Seas of East Asia adopted by the Ministerial Forum in December 2003, provide directions and approaches for tackling the challenge. The WSSD Plan of Implementation requires:

- The application by 2010 of the ecosystem-based approach (Para.29)
- Integrate, multidisciplinary and multisectoral coastal and ocean management at the national level (Para.29)
- Restoration of depleted fish stocks to the MSY level not later than 2015 (Para. 30)
- Managing fishing capacity by 2005 (Para.30)
- Establishment of MPA representative networks by 2012 (Para.31)
- GPA implementation particularly concerning municipal wastewater, physical alteration and destruction of habitat, and nutrients by 2006 (Para. 32)
- 50% increase in people's access to safe drinking water and basic sanitation by 2015 (Para. 7)

The SDS-SEA stipulates that “ecosystem-based management approaches shall be applied to ensure sustainable development of coastal and marine areas,” and includes it among its general principles. In protecting ecosystems, human health, and society, the SDS-SEA outlines the following actions to be undertaken:

- Mainstreaming integrated coastal area and watershed management strategies and policies across levels of governments, government agencies and institutions, and social and economic sectors (1.c, Objective 2, Protect).

- Incorporating intergovernmental initiatives in environmental management of river basins, subregional sea areas and LMEs into a management framework for the regional seas (1.e, Objective 1, Protect).
- Forging institutional cooperation among national and local governments, river basin authorities, port authorities and coastal area managers (1.d, Objective 1, Protect).
- Addressing and managing the environmental risks of shipping, dredging, land reclamation, aquaculture, seabed mining, and other resource extractive industries within the context of ecosystem-based management and public benefits.

There are strong interconnections among the problems facing us and the management targets to be achieved. For example, the water quality and habitat conditions in the estuaries and the adjacent sea areas are closely related to those of the rivers upstream. Nutrient reduction in sea has a lot to do with industries, agriculture, forestry, and waste management on land. Restoration of depleted fish resources can hardly succeed without improved water quality and management of fishing efforts. In this context, “ecosystem-based management“ can be defined as a systematic approach to addressing a set of issues in consideration of their interactions governed by ecosystem attributes and related socioeconomic consequences. The nature, scope and extent of the management should be determined by the ecosystem effects, impacts and consequences, rather than by legal, administrative and disciplinary divisions or boundaries. As such the ecosystem-based approach may offer a better management tool in addressing interconnected problems and management targets.

How to Operate Ecosystem-Based Management?

In operational terms, ecosystem-based management for coastal and marine waters should aim at establishing the following seven areas of linkages:

1. The consideration of both upstream and downstream impacts and consequences of development and management processes within a given water system.
2. Restoration of the depleted resources with prevention of these resources from further misuses and overexploitation.
3. Environmental and resource objectives with goals for poverty alleviation, sustainable livelihood and reduction of vulnerability for natural hazards.
4. Both land and water use management programmes.
5. Research, monitoring, information management, assessments, with formulation and implementation of management strategies and programmes.
6. Governments, agencies, academes, communities, private sector and other stakeholders in the decision making process as essential partners / collaborators.
7. Development of management strategies and programmes with creation of investment opportunities and sustainable financing mechanisms.

Initiatives have been undertaken to apply some of these elements in managing interrelated water systems, such as:

- Chesapeake Bay programme
- The Seto Inland Sea programme

- Bohai Sea environmental management programme
- Manila Bay environmental management programme, Philippines
- Masan-Chinhae Bay environmental management programme
- World Bank / GEF Strategic Partnership for a Land-Based Pollution Reduction Investment Fund for the LMEs of East Asia
- Danube/Black Sea project focusing on nutrient reduction
- The proposed UNEP H₂O (from the hilltops to the oceans) initiative for achieving wastewater emission targets

The approaches, experiences and lessons learned from these initiatives can be distilled, packaged and further field-tested before scaling up to address the challenge of ecosystem-based management for coastal and marine waters.

PEMSEA's New Initiative in Ecosystem-Based Management

PEMSEA is undertaking an initiative in ecosystem-based management for interrelated river basins, estuaries and the adjacent coastal seas as part of its regional endeavour to build up the capacities of the countries and the region to implement the SDS-SEA (the proposed GEF/UNDP PDF-B).

Goal and Objectives

The goal of the initiative is to enable the countries of the region in resolving priority coastal and marine water quality and resource problems, in relation to consumption and use pattern, and governance reform, from the ecosystem-based management perspective. Specifically, it has a twofold objective:

- Help the countries of the region to implement the strategies and action programmes of the SDS-SEA related to water resources.
- Provide them with better operational approaches and modalities for achieving the WSSD targets for sustainable uses of water resources in coastal and marine area.

Operational Framework

Based on the experiences and lessons learned particular in the region, six essential action components have been identified, the effects of which in combination may determine the success or failure of policies, efforts or programmes in tackling coastal and marine water resource problems:

- Water pollution prevention and reduction, nutrient reduction in particular
- Habitat and living resource protection and restoration
- Land and water use management
- Cross-jurisdictional decision making mechanisms and processes
- Scientific support
- Sustainable financing mechanisms and investments

These action elements are expected to bring about the seven areas of linkages for the ecosystem-based management for coastal and marine waters mentioned in the previous section. Public awareness and participation, stakeholder involvement, training, education and other capacity building activities are the cross-cutting elements, and should be embedded in all the components.

The level of operation in each component may vary, depending on the capacity and resources. For example, in water pollution prevention and reduction, there are levels of difficulties in managing pollution in terms of land, sea or air based sources. The same is true to improving decision-making mechanisms and processes where regulatory or long term institutional arrangements may be more difficult to achieve than *ad hoc* or short term fixes. In order for the countries of the region to adopt stepwise the ecosystem-based management approach and to assess progress being made, three tiers of actions can be identified, depending on the scope of ecosystem impact elements being addressed and level of capacity:

- Tier 1 may address single impact elements with limited capacity and resources.
- Tier 2 may address part of the impact elements with enhanced policy and technical and financing capacity
- Tier 3 may address all the major impact elements with advanced capacity

Matrix 1 tabulates some indicative action elements of the 3 tiers under the 6 action components.

Activities

The initiative may entail activities in two mutually reinforced components: a) capacity building programme for ecosystem-based management in the selected sites; and b) twinning arrangements for the site-specific programmes. The site-specific approach is to develop and test ecosystem-based management framework and methodology at the country level. The twinning arrangements is to distill, package and extend the experiences and lessons gained from the sites through knowledge management and sharing as a feedback for improving programme implementation at the sites, as well as for extension within and beyond the region.

- A. Site-specific capacity building programmes for ecosystem-based management for the interrelated river basins, estuaries and coastal seas in the Seas of East Asia

Capacity building programmes for ecosystem-based management will be developed in Bohai Sea (China), Jakarta Bay (Indonesia), Manila Bay (Philippines), and Masan-Chinhae Bay (RO Korea) which are located in different LMEs and climatic zones, and representing different levels of development and socioeconomic systems. Programme formulation and implementation in these sites are subject to specific features and conditions of these sites, particularly the current levels of development in managing coastal and marine water resources. Action elements of the programmes may include:

Matrix 1: MANAGEMENT FRAMEWORK FOR INTERRELATED WATERSHEDS, ESTUARIES AND COASTAL SEAS

Area Level	Water Pollution Prevention / Reduction	Habitat & Living Res. Protection & Restoration	Managing Land & Water Uses	Cross-Jurisdictional Decision-Making	Scientific Support	Financing & Investment
Tier 1	Land- and/or sea-based point sources	Some protection or restoration, but weak management of harvesting	Partial land use master program (or zoning), urban, rural, or sector specific	<i>Ad Hoc</i> info sharing and policy consultation	Initial database & risk assessment (RA), water quality (WQ) modeling	Government expenditures, national and / or subnational
Tier 2	Land- and sea-based point- and discrete (non-point) sources	Protection & restoration, but weak management of harvesting	Multisectoral land use master program (or zoning), urban and rural	Policy consultation mechanisms without regulatory role	Time series data (with baseline), refined RA WQ-Watershed modeling	Public and private inputs, partnerships, financing and investment
Tier 3	Land, sea, air based point- and discrete sources	Protection, restoration and proper management of harvesting	Multi-sectoral Land and water use master program (or zoning)	Policy consultation mechanisms with effective regulatory role	Time series data, refined RA, WQ-Watershed-Air-shed modeling	More diversified mechanisms (bonds, revolving fund, cost sharing, etc)

- a) Establishing a basin wide interagency and multisectoral management mechanism;
- b) Integrated land and water use programmes and/or zoning schemes;
- c) Water pollution (e.g., nutrient) reduction and implementation targets and schemes for rivers, tributaries and estuaries;
- d) Investment plan for major water, sewage and sanitation facilities;
- e) Policy reform and improved use of market-based regulatory instruments for the pollution reduction, e.g., water and waste water tariffs, water pollution fines;
- f) Community-based waste minimization programmes;
- g) Sustainable fisheries and aquaculture;
- h) Alternative livelihood programme;
- i) Environmental monitoring, risk assessment and information management programmes
- j) Distill and package experiences and lessons from the implementation of the action plans, focusing on approaches to managing the linkages between riverine, estuarine and marine water resources.

B. Twinning arrangements for the ecosystem-based management programmes to promote knowledge management and transfer

Twining arrangements are to network the ecosystem-based management programmes across the sites in order to: (a) facilitate information sharing; (b) provide technical support to the programme implementation; and (c) distill, compare and package experiences and lessons learned for extension. In addition to the 4 sites of implementing the capacity building programmes, the twinning arrangements are expected to involve ecosystem-based management programmes for Seto Inland Sea, Japan, and the Chesapeake Bay, USA, to benefit from their many years of practices in this field. The twinning arrangements may contain the following activities:

- a) Networking the ecosystem-based management programmes in the identified sites to facilitate the knowledge management and transfer
- b) Conducting cross-site study tours to share experiences on good practices and lessons learned for the integrated management of coastal seas, bays, estuaries, river basins and watersheds.
- c) Organizing cross-site task teams and workshops to develop guidelines / manuals on the approaches/methods concerning:
 - Basin wide management
 - Determination of water quality management objectives/ pollution loads / pollution reduction allocation
 - Market-based regulatory tools
 - Training programme on these approaches / methods
- d) Training programme delivery

Efforts should be made to turn the twinning arrangements for ecosystem-based management programmes into *a self sustained and functional network*. The network could be serviced by *an operational unit* residing within a participating institution, depending on the commitments, capacities and other conditions. The hosting institution for the operational unit should provide necessary supporting staff and facilities for the

normal functioning of the unit. Detailed arrangements for the network and its operational unit, as well as its “business plan” should be worked out. The network members should be the institutions and programmes involved in the twinning the arrangements and other interested institutions and programmes.

The network members would have the following benefits:

- Participation in the training, study tours and workshops being organized by the network
- Receiving guidelines, manuals, reference materials and other publications produced by the network
- Receiving technical advice and assistance from the network in the development of sustainable financing options and creation of investment opportunities for waste management, pollution reduction and other environment improvement projects

The network members should contribute to the network in:

- Sharing information and knowledge on the site-specific ecosystem status and programme progress
- Hosting and funding the network activities, e.g., training, workshop, study tour
- Providing needed technical advice and assistance to other network members
- Supporting and financing the participation of the programme personnel in the network activities
- Providing inputs to the reports and publications of the network
- Other forms of contribution both in cash or in kind

Expected Outputs

The new initiative is expected to have the following outputs over the next five years:

1. Ecosystem-based management programmes in Bohai Sea, Jakarta Bay, Manila Bay, and Masan-Chinhae Bay implemented.
2. A self-sustained and functional network involving ecosystem-based management programmes for Bohai Sea, Chesapeake Bay, Jakarta Bay, Manila Bay, and Masan-Chinhae Bay, and Seto Inland Sea established.
3. Experiences and lessons learned from the programmes implementation and the twinning arrangements distilled and packaged for extension.