INSTITUTIONAL FRAMEWORKS FOR ECOSYSTEM-BASED MANAGEMENT IN THE ASIA PACIFIC REGION

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INTRODUCTION

Ecosystem-based management, as an approach to resolving the fragmented management of the oceans and achieving the goals of sustainable development and biodiversity and ecosystem integrity, is becoming increasingly significant in managing the vast expanse of the oceans and seas of the Asia-Pacific region. While the regionalization of the oceans and seas of the Asia-Pacific region has been set up for its better management, the unique and diverse nature of the South China Sea, East China Seas, Southern Ocean, Sulu-Sulawesi Seas, and Central and Western Pacific Oceans calls for the need to formulate a sound management regime that transcends political boundaries and takes into account the ecological features and processes that will help achieve the long-term sustainability of living resources and environment of the ocean regions.

The most desirable condition in terms of ocean management in a regional scale is where a certain spatial extent of an ocean, which is encompassed by a particular management programme, fully coincides with the spatial extent of an ocean ecosystem or with a set of contiguous ecosystems.[1] However, most established ocean management areas, particularly in the Asia-Pacific region, are far from being in this perfect state of an ocean region. There are also management problems such as the lack of understanding of the marine ecosystems in the area, existence of arbitrary and politically defined management areas, local and self-interest politics, economic determinism, obscure management goals, and top-down planning and management processes which impedes the proper and more integrated ocean space and resource management.

This paper focuses on the existing regimes that adopt ecosystem-based management as a principle to the sustainability of natural resources and protection of the environment in the Asia-Pacific region and highlights the international legal basis for the principle. It also identifies the challenges that the governing institutions face in implementing measures related to this approach to management and proposes measures to address such challenges.

ECOSYSTEM-BASED MANAGEMENT IN INTERNATIONAL INSTRUMENTS

The awareness of the need to protect the oceanic ecosystem can be traced in the discussion of the problem of transboundary marine pollution in the 1970s which has been

[1] Adalberto Vallega, "The Regional Approach to the Ocean, the Ocean Regions, and Ocean Regionalisation—A Post-Modern Dilemma," *Ocean and Coastal Management* 45 (2002): 753.

only extended in the early 1990s to include concerns for living aquatic resources and their ecosystems under the United Nations Conference on Environment and Development (UNCED).[2] The principle of ecosystem approach to management has also found its way in the different international instruments.

The United Nations Convention on the Law of the Sea

The United Nations Convention on the Law of the Sea (LOSC) provides a comprehensive framework the management of all marine resources and uses of the oceans and establishes distinct maritime zones where sovereignty, jurisdiction, and sovereign rights can be exercised by states. LOSC acknowledges that "the problems of ocean space are closely related and need to be considered as a whole." With respect to ecosystem approach to management, the Convention also establish the obligation of states to consider the interdependence of fish stocks (Article 61(3)) and effects of fishing on species associated with or dependent on harvested species (Article 61 (4)) in the exclusive economic zone and the high seas (Article 119 (1) (a) and (b)). States are also required to take measures to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life as part of protecting the marine environment (Article 194 (5)). Although the Convention has adopted measures related to the ecosystem approach to management, the legal boundaries set for maritime zones do not coincide with ecosystem boundaries. This could have implications on the application of ecosystem-based management measures in overlapping jurisdictions.

(APEC economies which have ratified the Convention: Australia, Brunei Darrusalam, Chile, China, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Philippines, Russia, Singapore, Vietnam)

Rio Declaration and Chapter 17 of Agenda 21

Principle 7 of the Rio Declaration states that countries should cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the earth's ecosystem. This is the closest reference that one finds among the principles established under the Rio Declaration to any need to promote and protect biodiversity. However, the principles contain no reference to the particular need to protect rare and fragile ecosystem.[3]

It was the adoption of Agenda 21 that considered the management of the ecosystem as an entirety, including the biotic and abiotic components. Chapter 17 calls for coastal states to commit themselves to integrated management and sustainable

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[2] S.M. Garcia and M. Hayashi, "Division of the Oceans and Ecosystem Management: A Contrastive Spatial Evolution of Marine Fisheries Governance," *Ocean and Coastal Management* 43 (2000): 460.

[3] John Van Dyke, "The Principles and Our Responsibilities of Ocean Stewardship," *Ocean and Coastal Management*, 31:1 (1996), 5.

development of coastal areas and the marine environment under their national jurisdiction (Par. 17.5) and undertake measures to maintain biological diversity and productivity of marine species (Par. 17.7). In order to conserve the use of marine living resources in the high seas, states are encouraged to take into account the relationships among species and relevant environmental and economic factors (Part 17.46). Protection of marine areas with high levels of biodiversity and productivity should also be promoted (Par. 17.85) particularly in small-island developing states (Par. 17. 124).

(Agenda 21 was adopted by more than 178 governments at UNCED)

Code of Conduct for Responsible Fisheries

Under the Code of Conduct, States are encouraged to conserve the biodiversity of aquatic habitats ecosystems (Par. 6.1 and 7.2.2a), consider the transboundary nature of many aquatic systems (Par 6.4), ensure that conservation measures are not only applied to target species but also to species belonging to the same ecosystem or associated with or dependent upon the target species (Part 6.2 and 7.2.3), and take into account the fragility of coastal ecosystems and integrated use of the resources. It is also maintained that all critical fisheries habitats in marine and fresh water ecosystems, such as wetlands, mangroves, reefs, lagoons, nursery and spawning areas, should be protected and rehabilitated as far as possible and where necessary (Par. 6.8). States should also take into account the fragility of coastal ecosystems in adopting

(Adopted by consensus at the Twenty-eighth Session of the FAO Conference in 1995)

UN Fish Stocks Agreement

The UN Fish Stocks Agreement considers the need to preserve biodiversity and maintain the integrity of marine ecosystems. It stipulates that states should adopt conservation and management measures for species belonging to the same ecosystem or dependent on or associated with the target stocks (Article 5(d) and (e)). States should also take into account the biological unity and other biological characteristics of the stocks and the relationships between the distribution of the stocks, the fisheries and the geographical particularities of the region concerned, including the extent to which the stocks occur and are fished in areas under national jurisdiction (Article 7(d)).

(*APEC economies which have ratified the Convention: Australia, Canada, New Zealand, Papua New Guinea, Russia, United States)*

Other International Instruments

A relevant international legal instrument in ecosystem-based management is the ***Convention on Biological Diversity***. The Convention has the primary objective to conserve biological diversity (Article 1) and notes that the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in

their natural surroundings as the fundamental requirement to achieving this objective (Article 8). The ***Jakarta Mandate on the Conservation and Sustainable Use of Marine and Coastal Biological Diversity*** is another relevant document.

MARPOL 73/78 also adopts the concept of ecosystem approach to management. It defines special areas as a sea area where, for recognized technical reasons in relations to its oceanographic and ecological conditions and to its particular transportation traffic, the adoption of special mandatory methods for the prevention of sea pollution by oil, bulk noxious substance or garbage is required. (Annex I, 1 (10), II (1 (7) and V (1 (3)). From this concept, the International Maritime Organization (IMO) developed the concept of particularly sensitive sea areas which are considered as zones that need special protection because of their recognized ecological and socio-economic importance and the vulnerability of their environment to possible harm from maritime traffic. The Great Barrier Reef of Australia is the first sensitive sea area recognized by IMO.

(APEC economies which have ratified the Convention on Biological Diversity: Australia, Canada, Chile, China, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Vietnam)

(APEC economies which have ratified the MARPOL Convention: Australia, Brunei Darrusalam, Canada, Chile, China, Indonesia, Japan, Korea, Mexico, Papua New Guinea, Peru, Russia, Singapore, United States, Vietnam)

THE INSTITUTIONAL FRAMEWORK FOR ECOSYSTEM-BASED MANAGEMENT IN THE ASIA-PACIFIC REGION

The Asia-Pacific region has large and diverse ecosystems, many of which are threatened. Coastal degradation and biodiversity loss are two of the most pressing environmental challenges faced by the region. Biological resources have long been of subsistence and have been increasingly exploited for trade purposes. Protected areas in the region constitute only five percent of the total area, compared to the International Union for the Conservation on Nature and Natural Resources (IUCN) benchmark of ten percent.[4] In the past thirty years, depletion of coastal resources such as fisheries, mangroves, and coral reefs has emerged as a critical issue for the region. These challenges are further compounded by problems of overpopulation, poverty, and increasing urbanization, industrialization, and tourism. The nature of these challenges is complex, not to mention transboundary, thus creating the need for states to cooperate in order to understand the interplay of the different elements that make up the region's oceanic processes, ecosystems, and natural resources.

Ecosystem-based management plays an important role in enhancing the sustainability of the natural resources and protecting the marine environment of the Asia Pacific region. There are several institutions that utilize this approach in governing ocean

[4] UNEP Regional Office for the Asia and the Pacific. "Major Environmental Issues," Available in <http://206.67.58.208/uneproap/region/major.html> Accessed on 20 May 2003.

areas in the region. Three Regional Seas Programmes and several fisheries management organizations utilize this approach while several ocean areas in the region have been identified as Large Marine Ecosystems, a concept which employs principles very similar to those used in ecosystem-based management.

Regional Seas Programme

The Regional Seas Programme of the United Nations Environment Programme (UNEP) was established to formulate a comprehensive approach to addressing environmental problems in the management of marine and coastal areas. Three regional institutions have been established in the Asia-Pacific Region to govern the East Asian Seas, South Pacific Ocean, and Northwest Pacific Ocean. The Coordinating Body on the Seas of East Asia, South Pacific Regional Environment Programme, and Northwest Pacific Action Plan's Regional Coordinating Unit have not only adopted the principle of integrated management but have further implemented strategies which are related to the concept of ecosystem approach to management. The Partnerships in Environmental Management for the Seas of East Asia, on the other hand, made no mention of this type of management although it recognizes the relevance of the protection of marine ecosystems in environmental management.

Coordinating Body on the Seas of East Asia (COBSEA)

UNEP has formulated the Action Plan for the Protection and Sustainable Development of the Marine Environment and Coastal Areas of the East Asian Region in 1981 to establish a regional scientific programme that will involve research on the prevention and control of marine pollution in the area. The implementation of this Action Plan is governed by the Coordinating Body on the Seas of East Asia (COBSEA), which is composed of Australia, Cambodia, China, Indonesia, Republic of Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Although ecosystem-based management has not been explicitly mentioned in the plan, three of the long-term strategies of COBSEA are related to the concept. These are the integration of projects and plans to achieve a regionally-balanced approach to the conservation of marine habitats of the East Asian seas, identification of regional priorities for action particularly the protection of biodiversity, ecosystem rehabilitation, and management of pollution, and increasing the awareness of decision makers and the community on socio-economic, cultural, and ecological importance of marine ecosystems.[5]

The Action Plan is composed of an assessment of the effects of human activities on the marine environment, control of coastal pollution, protection of mangroves, seagrasses, and coral reefs, waste management, and technology transfer. It has established a project to undertake a large scale transboundary diagnostic analysis of the

[5] United Nations Environment Programme, "Vision and Plan: A Systematic Approach. Long-term Plan of East Asian Seas Coordinating Unit," EAS/RCU, Bangkok, Thailand, 2000. Available in <http://www.easrcu.org/Publication/COBSEA/LTPlan.pdf> Accessed on 20 May 2003.

South China Sea and the Gulf of Thailand. This project led to the development of a cluster of other projects on the protection of marine biodiversity including critical fisheries habitats, establishment of a system of marine protected areas, address pollution from land-based activities, and management the freshwater basins, all of which are essential elements in ecosystem-based management.

South Pacific Regional Environment Programme (SPREP)

The South Pacific Regional Environment Programme (SPREP) is an intergovernmental organization composed of twenty-two Pacific island countries and territories and four developed countries, which looks into resolving environmental concerns and promoting the sustainability of the natural resources of the region.[6] Similar to the COBSEA Action Plan, the Agreement establishing SPREP did not make reference to ecosystem-based management as a principle but largely recognizes the importance of the ecological characteristics of the region in its proper management. One of its objectives is to promote and develop programmes to protect the atmosphere, terrestrial, freshwater, coastal and marine ecosystems and species while ensuring ecologically sustainable utilization of resources. Under SPREP, an Action Plan for Managing the Environment of the Pacific Island Region from 2001 to 2004 was formulated.[7] Under the key programme of nature conservation, a sub-programme on ecosystem management was formulated. It aims to raise public awareness and understanding of the role of ecosystems (coastal and marine, forest, and atolls) in maintaining the integrity of islands and their importance in the economy. SPREP hopes to integrate the outcomes of this nature conservation programme with key results of other programmes such as pollution prevention, climate change, and economic development in order to provide a comprehensive approach to resolving environmental concerns.

Part of the legal framework for the management of the environment of the Pacific Island Region has adopted concepts related to ecosystem-based management. Article 14 of the Convention for the Protection of the Natural Resources and Environment of the South Pacific Region mandates states parties to protect and preserve rare or fragile ecosystems and depleted, threatened or endangered flora and fauna as well as their habitat in the Convention area. Thus, member countries are required to establish protected areas and regulate all activities that have adverse effects on the species, ecosystems or biological processes that such areas are designed to protect. On a similar note, the Convention on the Conservation of Nature in the South Pacific encourages states to create protected areas and consider the introduction of alien species to ecosystems.

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[6] South Pacific Regional Environment Programme. Available in <http://www.sprep.org.ws> Accessed on 20 May 2003.

[7] South Pacific Regional Environment Programme. "An Action Plan for Managing the Environment of the Pacific Island Region," Available in <http://www.sprep.org.ws> Accessed on 20 May 2003.

Northwest Pacific Action Plan's Regional Coordinating Unit

The Northwest Pacific Action Plan Coordinating Unit, co-hosted by Japan and Korea and participated in by China and the Russian Federation, is the centre that looks into the implementation of the different activities under the Action Plan.[8] The Plan focuses on the wise use, development and management of the coastal and marine environment for the economic development of the region. Although most of the projects involve the protection of the environment from sea-based sources of pollution and maritime safety, the Action Plan also aims to establish programmes to protect the marine and coastal biodiversity and initiate programmes for sustainable management of living resources based on the ecosystem approach. This regional programme might be new with a much simpler institutional framework compared to those of COBSEA and SPREP but it has expressly adopted the ecosystem-based management as a strategy in achieving sustainable development in the area.

Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)

The Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), is a regional programme established in 1999 following the Regional Programme for Marine Pollution Prevention and Management in the East Asian Seas. It is being implemented by the United Nations Development Programme (UNDP) and International Maritime Organization (IMO) and funded by the Global Environment Facility (GEF) which aims to protect the life support system of the seas of East Asia and enable the sustainable use of their renewable resources through intergovernmental, interagency, and intersectoral partnerships. Participating countries to this programme include Bruei Darussalam, Cambodia, Korea, Indonesia, Japan, Malaysia, China, Philippines, Singapore, Thailand, and Vietnam.

The Programme only made mention to the implementation of integrated coastal zone management but there was no direct reference to the ecosystem approach to management in its strategies or projects. However, it recognizes the transboundary nature of the environmental problems in the region, continuos or imminent loss of endangered and threatened species, continuous degradation of the quality of coastal waters from land-based and sea-based sources of pollution, application of ineffective measures to regulate open access resulting in the overexploitation of coastal and marine fisheries, and inadequate and ineffective enforcement and compliance of national and international legal instruments. This programme also recognizes that these transboundary problems and the semi-enclosed nature of the East Asian seas have far-reaching ecological and socio-economic implication for the region.

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[8] United Nations Environment Programme. "Northwest Pacific: Making History," Available in <http://www.unep.org> Accessed on 19 May 2003.

Large Marine Ecosystem (LME) Management Approach

As a means of improving coastal and ocean stewardship agreed in UNCED in 1992, the IUCN and the National Oceanographic and Atmospheric Administration (NOAA) have joined in an action program to help countries apply the Large Marine Ecosystems (LME) approach as an ecosystem-based management strategy. Large marine ecosystems are regions of oceans space encompassing coastal areas from river basins and estuaries to the seaward boundary of continental shelves and the seaward margins of coastal current systems.[9] LMEs are relatively large regions of some 200,000 square kilometers characterized by distinct bathymetry, hydrography, productivity, and trophically dependent aquatic populations.[10] This concept moves away from a highly focused and short-term management to a larger spatial scale long-term management of ocean spaces and resources.

In the Asia-Pacific region, several LMEs can be identified—the South China Sea, the East China Sea, Sulu-Celebes Seas, Indonesia Sea, Gulf of Thailand, and Australian Shelves. The identification of such areas as large marine ecosystems is only the first step to the adoption of the ecosystem-based management. The formulation of sound management measures and practices and the establishment of a governing institution that will implement such measures should be the succeeding steps in the management of these LMEs. Unfortunately, among the LMEs identified in the Asia-Pacific region, only the Indonesian Sea, Gulf of Thailand, and the Australian shelves have governing institutions only because they happen to be within the jurisdiction of individual states. The South China Sea, East China Sea, and the Sulu-Celebes Seas which are bordered by many states do not have established institutional arrangements which adopt the ecosystem-based management as a principle in governing the vast expanse of waters.

South China Sea Large Marine Ecosystem

The South China Sea LME is in a serious decline. There is no regional institution managing the resources in this area although there have been projects and regional plans that have formulated primarily to reverse the degradation of the marine environment in the area. Conflicting state interests and power politics have characterized the interaction of the different states in the region and are further made complicated by tension on territorial claims. These challenges prevent most cooperation among littoral states on the management and conservation of resources in the semi-enclosed sea.

East China Sea Large Marine Ecosystem

East China Sea LME is characterized by a rapid economic development that leads to the overexploitation of the resources in the area. China, Japan, and Korea are behind

[9] "Large Marine Ecosystems of the World," <http://www.edc.uri.edu/lme/intro.htm> Accessed on 14 May 2003.
[10] Garcia and Hayashi, 464.

the governance of the region and these countries have conducted comprehensive studies on the pollution levels and state of fisheries in the area. However there is no single institutional arrangement for the management of natural resources in the area.

Sulu-Sulawesi Sea Large Marine Ecosystem

The marine resources in the Sulu-Sulawesi LME are overexploited as they play an important role in the export and domestic markets of the Philippines, Malaysia, and Indonesia. Littoral states have very little measures to protect the ecological limits of the natural resources in the region. While there have been projects focusing on increasing public awareness on fisheries conservation and environmental protection in the area, much still needs to be done, and there is no institution for ecosystem-based management that has been created so far for this ocean region.

Other Large Marine Ecosystems

There are other LMEs in the region such as the Indonesia Sea, Gulf of Thailand, and Australian Shelves (East Central, Southeast, West-Central, North, Northeast, Northwest, Southwest) which belong to the jurisdiction of single states. Although governing institutions have been established for these LMEs, they are still confronted by different challenges related to the demarcation of jurisdiction and responsibilities, establishment of proper transboundary management, and conservation objectives with respect to fisheries resources, marine reserves, and environment.[11]

Regional Fisheries Organizations

The ecosystem approach to management was discussed at the Twenty-fourth Session of the Committee on Fisheries (COFI) of the Food and Agriculture Organization (FAO) and paved the way to a much more elaborate dialogue on the matter at the Reykjavik Conference in 2001 which led to the adoption of the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem. This declaration put forward key elements such as the inclusion of ecosystem considerations in fisheries management, more effective conservation of the ecosystem and sustainable use and increased attention to interactions of fish stocks, and understanding the impact of human activities on the ecosystem.

In the Asia-Pacific region, several regional fisheries management organizations have adopted the ecosystem approach to management. These organizations are the Commission on the Conservation of Antarctic Marine Living Resources (CCAMLR), Forum Fisheries Agency (FFA), Indian Ocean Tuna Commission (IOTC), Commission for the Conservation of Southern Bluefin Tuna (CCSBT), and Commission for the Conservation and Management of Highly Migratory fish Stocks in the Western and Central Pacific Ocean. Some of the ecosystem-based management measures adopted by these regional institutions are the consideration of the interdependence of fish stocks, be

[11] National Oceanographic and Atmospheric Administration Northeast Fisheries Center. “Large Marine Ecosystems of the World” Available in <http://na.nefsc.noaa.gov> Accessed on 19 May 2003.

they harvested, associated, or non-target species, protection of the biodiversity of the marine environment, and impacts of human activities on the marine ecosystems.

Commission on the Conservation of Antarctic Marine Living Resources (CCAMLR)

The Commission on the Conservation of Antarctic Marine Living Resources (CCAMLR) is a pioneer in the development of the ecosystem approach to fisheries management. The first line of the preamble of the CCAMLR Convention recognizes the importance of safeguarding the environment and protecting the ecosystems of the surrounding seas of Antarctica. The Convention further acknowledges the need to increase the understanding of the marine ecosystems in the region, and the complexity of the marine living resources of the area with each other and its physical environment. This strongly characterizes the application of ecosystem-based approach to management in CCAMLR waters. According to Article 2 of the Convention, any harvesting and associated activities in the area should comply with the conservation principles of the area which include the maintenance of the ecological relationships between the harvested, dependent, and related populations of the Antarctic marine living resources and prevention of changes or minimization of the risk of changes in marine ecosystems. It further provides more specific conservation measures related to ecosystem approach to management in the Convention area.

Forum Fisheries Agency (FFA)

The Forum Fisheries Agency (FFA) was established in 1979 as an advisory and coordinating agency that assist member countries' needs to promote regional cooperation with respect to fisheries issue and secure maximum benefits from living marine resources of the region, particularly the highly migratory species. Ecosystem-based management was not mentioned in the 1979 Convention on South Pacific Fisheries Forum although it has been adopted in recent projects of the FFA. The oceanic fisheries management component of the Strategic Action Programme for the International Waters of the Pacific Small Island Developing States, for example, which was executed by FFA and South Pacific Commission (SPC) encourage states to manage the tuna resources for sustainable economic benefit and assist island states to fully participate in a tuna management organization under the Western Central Pacific Ocean region. The ecosystem in that area corresponds almost precisely with the commercial tuna fishery operating in the area. It takes into account non-target species in monitoring and regular stock assessments.

Indian Ocean Tuna Commission (IOTC)

The Indian Ocean Tuna Commission (IOTC) is an intergovernmental organization mandated to manage tuna and tuna-like species in the Indian Ocean and adjacent seas. It aims to promote cooperation among its members in conserving, managing, and utilizing

such fish stocks in an optimum way. The IOTC Agreement only outlines the institutional framework under the IOTC but did not mention any conservation principles that govern the management of the area; neither did it mention ecosystem-based management as a principle. There are only particular fish stocks which are being managed by this Commission, which is not a characteristic of an ecosystem approach to management. It was only until the Fourth Session of the IOTC in 1999 that ecosystem approach to fisheries management was discussed, in relation to the predation of marine mammals which encouraged the conduct of research on oceanic ecosystems.[12] It was also agreed in the Fifth Session that stock assessments in the convention area should take into account the ecosystem approach to management, particularly on the effects of associated species.[13] It was only in 2002 that ecosystem-based management was mentioned in the resolutions formulated by IOTC, with respect to the survey of predation of longline caught fish and issues on bycatch. Researches on environmental characteristics and even the influences of climate on key ecosystem processes have also been considered in this session.

Commission for the Conservation of Southern Bluefin Tuna (CCSBT)

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) was created to ensure the conservation and optimum utilization of Southern bluefin tuna through appropriate management measures. One of its objectives is to foster activities related to the conservation of ecologically-related species or living marine species which are associated with southern bluefin tuna fishery and bycatch species. The Commission has also established a Working Group on Ecologically Related Species that will provide information and advice on issues related to species, both fish and non-fish, associated with Southern bluefin tuna, monitor trends on and factor affecting the population biology of ecologically related species, and provide advice on measures to minimize fishery effects on ecologically related species.

Commission for the Conservation and Management of Highly Migratory fish Stocks in the Western and Central Pacific Ocean

The Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean recognizes the need to preserve biodiversity and maintain the integrity of marine ecosystems. Article 5 of the Convention adopts measures that would consider the interdependence of fish stocks, protect biodiversity in the marine environment, and assess the impacts of fishing, and other environmental factors on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks. A Commission is to be established under this Convention to ensure the application of the ecosystem approach to management and the implementation of its provisions.

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[12] Fourth Session of IOTC, 1999.
[13] Fifth Session of IOTC, 2000.

Challenges for Ecosystem-Based Management in Asia-Pacific Region

- The basic challenge in ecosystem-based management in the Asia Pacific Region is that not all of its marine ecosystems have governing institutions that can implement measures related to this type of management. There are large marine ecosystems, particularly the South China Sea, East China Sea, and Sulu-Sulawesi Seas, which do not have regional management institutions set in place even though there might have been several relevant projects that have been conducted in these areas which implemented the ecosystem approach. The closest established organization that may look into the management of this area are the COBSEA and PEMSEA. However, COBSEA is only a regional scientific programme that involves the conduct of research on the prevention and control of marine pollution in the East Asian Seas. While it may have adopted ecosystem-based management principles, the regional body's established Action Plan will not adequately address all management needs of these LMEs because it has not been specifically designed for this purpose. Similarly, PEMSEA is only a programme whose concerns revolve around the protection of the marine environment from land and sea-based sources of pollution. It has not even directly adopted the ecosystem-based approach to management in its major strategies.

- Identified marine ecosystems in the region also do not fully coincide with the management areas established under regional institutions. Thus, with the limited mandate and jurisdiction of these organizations, it will be difficult for the ecosystems to be managed in its entirety. There will always be areas of the marine ecosystem where the ecosystem-based management measures will not be applied.

- Asia Pacific countries also subscribe to different international conventions and states may have inconsistent laws, policies, and measures related to ecosystem-based management. Even regional environmental and fisheries organization in the region have embraced different measures related to the concept which lead to the application of inconsistent policies across similar ecosystems.

- The divisions of the oceans established under the LOSC create rights that states exercise to protect their marine environment and manage their natural resources. Ecosystem boundaries do not correspond to these divisions. Particularly in areas of overlapping territorial claim and maritime jurisdiction in the Asia Pacific, the legal regime under the Convention makes the application of ecosystem-based management measures difficult to implement.

- There is lack of full understanding of the marine ecosystems and interdependence of fisheries resources in the ocean areas of the region.

Proposed Measures

- Regional organizations should be established for the management of large marine ecosystems of the South China Sea, Sulu-Sulawesi Sea, and East China Sea. Management bodies for the LMEs of Sulu-Sulawesi and East China Seas are easier to be established because it entails the involvement of a very limited number of littoral states. However, due to the tension created by overlapping territorial claims in the South China Sea, it would be more plausible to leave the management of this large marine ecosystem to a regional political body like the Association of Southeast Asian Nations (ASEAN). Another option is to expand the mandate of COBSEA or PEMSEA to include specific measures for ecosystem-based management in the three LMEs.

- The creation of new regional environmental and fisheries organizations to ensure the application of ecosystem-based management might prove to be impracticable at this point. Thus, the adoption of similar ecosystem-based management measures among existing regional bodies and individual states seems to be the best approach to deal with the ecosystem challenges in the Asia-Pacific region. The harmonization of policies and measures among littoral states is ideal in the effective management of the region's ocean and seas. Along this line, the accession of states in the Asia Pacific to relevant international conventions should be encouraged.

- Ecosystem-based management measures should respond to the problems in the region like coastal degradation, loss of biodiversity, depletion of fisheries resources, and destruction of fish habitats, mangroves, and coral reefs while taking into account the long-standing problems of overlapping territorial claims and maritime boundaries and other political constraints to cooperation in the region.

- There should be an increased cooperation among regional environment and fisheries organizations in the region to apply the ecosystem approach to management. These institutions should ascertain the integration of projects and plans related to the protection of biodiversity, preservation or rehabilitation of rare and fragile ecosystems, conservation of fisheries habitats, management of pollution from land-based activities, establishment of a system of marine protected areas, and management of freshwater basins. This will result in a more comprehensive approach to the management of the region's ecosystems and will help avoid duplication of efforts among states and regional bodies.

- The lack of full understanding on the ecosystems, biological processes, interdependence of fish stocks, and impacts of human activities on the marine ecosystems in the region create the need for stronger capacity-building among states and regional organizations. Sharing of knowledge and information is crucial in building the capacity of states to effectively manage their resources and protect the marine environment.

- Individual states should adopt the ecosystem-based management as a principle in the protection and conservation of its natural resources and marine environment. States may also consider the adoption of the concept of Marine Catchment Basin which integrates the management of terrestrial catchment basin with the management of coastal ecosystem.[14] This would expand the concept of ecosystem approach to management. While the LME considers land influences as "externalities," MCB recognizes the impacts of land-based pollution and degradation to integrated ecosystem management. This concept has not been applied in any area for two reasons. Firstly, there is difficulty in differentiating terrestrial from maritime jurisdiction and secondly, major international institutions like UNEP, United Nations Development Programme (UNDP), World Bank, and Global Environmental Facility (GEF) have only supported the concept of LME and not this model.

[14] Garcia and Hayashi, 466.