

Report of the International Coral Reef Initiative (ICRI)
Second Regional Workshop for the East Asian Seas
Okinawa, Japan
16-20 February, 1997

the Organizing Committee for the Second
Regional Workshop for the East Asian Seas

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Preface

This report is the formal document of the second regional workshop for the East Asian Seas, the International Coral Reef Initiative (ICRI). The Organizing Committee officially organized the workshop, composed of the Environment Agency, the Ministry of Foreign Affairs, the Science and Technology Agency, the Okinawa Development Agency, the Ministry of Agriculture, Forestry and Fisheries, the Ministry of Education, Okinawa Prefectural Government, Marine Parks Center of Japan and the UNEP for steering the workshop.

The Committee held this workshop in Okinawa during 16-20 February 1997.

Special thanks are due to Dr. Kenji Konishi, Emeritus Professor of Kanazawa University and Dr. Richard Kenchington, ICRI coordinator for convening of the workshop.

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Abbreviation

ADB	Asian Development Bank
AEGE	ASEAN Expert Group on Environment
AIMS	Australian Institute of Marine Science
AIT	Asian Institute of Technology
ASEAN	Association of South East Asian Nations
ASM	Aquanaut Survey Method
ASOEN	ASEAN Senior Officials on the Environment
APEC	Asia-Pacific Economy Congress
AUSAID	Australia Agency for International Development
BFAR	Bureau of Fisheries and Aquatic Resources/Philippines
CARICOMP	Caribbean Coastal Marine Productivity
CBCRM	Community Based Coastal Resources Management
CBD	Convention on Biological Diversity
CEP	Coastal Environment Program/Philippines
CIDA	Canada International Development Agency
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CNPPA	Committee on National Parks and Protected Areas
COBSEA	Coordinating Body for the Sea of East Asia
COREMAP	Coral Reef Rehabilitation and Management Project /Indonesia
CRIC's	Coral Reef Information Centers/Indonesia
CRMP	Coastal Resource Management Program
DANIDA	Danish International Development Agency
DENR	Department of Environment and Natural Resources/Philippines
EAP-AP	Environment Assessment for Asia and the Pacific
EAS	East Asian Seas
EAS/RCU	Regional Coordinating Unit for the East Asian Seas Action Plan
EEZ	Exclusive Economic Zone
EIA	Environment Impact Assessment
EMCC	Environment Monitoring Control Center/Malaysia
ENRIN	Environment and Natural Resource Information Networking
EPC	Executive Planning Committee
ESCAP	Economic and Social Commission for Asia and the Pacific
FAO	Food and Agriculture Organization
FINNIDA	Finnish International Development Agency
GBRMPA	Great Barrier Reef Marine Park Authority
GCRMN	Global Coral Reef Monitoring Network
GEF	Global Environment Facility
GEMS	Global Environment Monitoring System
GIS	Geographical Information System
GOOS	Global Ocean Observing System
GPA	Global Programme of Action
GRID	Global Resource Information Database
GTZ	German Agency for Technical Cooperation
ICLARM	International Center for Living Aquatic Resources Management
ICM	Integrated Coastal Management
ICZM	Integrated Coastal Zone Management
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Committee
IPAS	Integrated Protected Areas System
IRRI	International Rice Resource Institute
IYOR	International Year of the Reef
JICA	Japan International Cooperation Agency
KORDI	Korea Ocean Research and Development Institute
KOSEF	Korea Science and Engineering Foundation
LCR	Living Coastal Resources
LIPI	Research and Development Center for Oceanology/Indonesia
MCS	Monitoring, Control and Surveillance

MPAs	Marine Protected Areas
MPC	Marine Park Centers
MRC	Mekong River Commission
NCEA	National Commission for Environmental Affairs/Myanmar
NEA	National Environment Agency/Vietnam
NEAC	Northeast Asian Conference on Environmental Cooperation
NEAREP	North-East Asia Regional Environment Programme
NEQA	National Environmental Quality Act/Thailand
NETTLAP	Network on Environment Training at Tertiary Level in Asia and Pacific
NIPAS	National Integrated Protected Areas System/Philippines
NMSRP	National Marine Science Research and Development Programme/ Philippines
NOWPAP	North-West Pacific Action Plan
NSS	Nature Society Singapore
NTPICM	National Training Program on Integrated Coastal Management
OECE	Overseas Economic Cooperation Fund/Japan
OEPP	Office of Environmental Policy and Planning/Thailand
PCAMRD	Philippine Council for Aquatic and Marine Research
PCD	Pollution Control Department/Singapore
PFRMP	Philippine Fisheries Resources Management Program
PRA	Participatory Rapid Assessment/Philippines
RBF	Rochefeller Browsers Fund/Philippines
REA	Resource and Ecological Assessment/Philippines
ROAP	Regional Office for Asia and the Pacific of UNEP
RSP	Regional Seas Programme
SACEP	South Asia Cooperative Environment Program
SOMECEA	Senior Officials Meeting on Environmental Cooperation in North-East Asia
SPREP	South Pacific Regional Environment Programme
SRMCC	Singapore Reef and Marine Conservation Committee
SRPD	Strategic Planning and Research Department/Singapore
SUF	Singapore Underwater Federation
SUML	Silliman University Marine Laboratory
TTEG	Tripartite Technical Experts Group/Singapore
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UP	University of Philippines
USAID	United States Agency for International Development
WAB Act	Wild Animals and Birds Act/Singapore
WCS	Wildlife Conservation Society/USA

Introduction

1. The International Coral Reef Initiative (ICRI) was launched in 1994 as a partnership of developing and industrialized governments, non-government organizations (NGOs), international organizations, multilateral development banks and private sector aimed towards conservation, sustainable use and effective management of coral reefs and their associated ecosystems. The key to its success is seen in global and regional cooperation augmenting national initiatives.
2. The initial countries who launched the initiative were soon joined by many others. In addition to UNEP as one of the international organization partners, three of the UNEP's Regional Seas Programmes, the Caribbean Action Plan, South Pacific Regional Environment Programme (SPREP) and the East Asian Seas Action Plan through its Coordinating Body on the Seas of East Asia (COBSEA), were among the original supporters of ICRI when it was launched in 1994.
3. At the invitation of the Government of the Philippines, ICRI held its first international workshop in May 1995 at Dumaguete with over 120 participants from around the world. The Dumaguete workshop adopted a *Call to Action* and a *Framework for Action* which provide the basis for future international and regional action and cooperation.
4. In its subsequent phases ICRI aims to implement the *Framework for Action* at the regional and national levels. As an initial step, regional workshops covering all countries with coral reefs were planned and held. These regional workshops were based loosely on the areas covered by UNEP's Regional Seas Programme.
5. At the invitation of the government of Indonesia, the first ICRI Regional Workshop for the East Asian Seas was convened at the Sahid Bali Hotel, Denpasar (Bali), during 18-22 March 1996.
6. Representatives of Australia, the Kingdom of Cambodia, Indonesia, Japan, the Republic of Korea, Malaysia, Myanmar, the Philippines, Singapore, Thailand and the Socialist Republic of Vietnam attended the workshop. In addition, representatives from the Intergovernmental Oceanographic Commission (IOC-UNESCO), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the International Coral Reef Initiative Secretariat, the World Conservation Union (IUCN), the International Center for Living Aquatic Resource Management (ICLARM), Wetlands International (Indonesia), the Association of Southeast Asian Marine Scientist (ASEAMS), the Siam Environment Club and the Marine Science Institute of the University of the Philippines also participated.
7. The first workshop was organized by the UNEP Regional Coordinating Unit for the East Asian Seas Action Plan (RCU/EAS) with the financial contribution and cooperation of the Governments of Indonesia, Japan and Denmark and the cooperation of the ICRI Coordinator.
(referred from Report of the International Coral Reef Initiative (ICRI) Regional workshop for the East Asian Sesa, UNEP 1996 for items 1-7).
8. The Bali workshop adopted the East Asian Seas Regional Strategy which provides a basis for implementing the ICRI *Call to Action* and *Framework for Action* in the East Asian Seas region.
9. At next phase ICRI promotes country priority at the national levels.
10. At the invitation of the Government of Japan, the second ICRI Regional Workshop for the East Asian Seas was held at the Okinawa Convention Center, Okinawa, during 16-20 February 1997.
11. Representatives of Australia, Brunei Darussalam, Indonesia, Japan, Malaysia, Myanmar, the Philippines, Republic of Korea, Singapore, Thailand and Vietnam participated the workshop. In addition, representatives from UNEP Headquarters, UNEP/RCU/EAS, IOC/UNESCO, IUCN, Universities and International Non-governmental Organizations attended.
12. This report consists of the record of the proceedings of the ICRI the Second Regional workshop for the East Asian Seas (Okinawa, 16-20 February 1997).

I. Symposium

16 February 1997

1. Opening Addresses

- ◇ Ms. Michiko Ishii, Minister of State, Director General of the Environment Agency, the Government of Japan.

As the beginning of the International Coral Reef Symposium, she thanked the audience for their attendance at this event. She then emphasized the unfavorable status of coral reefs and the importance of preserving coral reefs, and the significance of holding this type of international conference. She reported to the audience that the Japanese government joined other countries to found the International Coral Reef Initiative upon the bilateral Japan-U.S. common agenda, and, being that as the fundamental framework, it dedicated itself for activities to promote sustainable utilization of coral reefs in East Asian Seas. She further explained that this Okinawa workshop would be the second workshop following the one held in Indonesia last year, and expressed her expectation that this symposium would be a great opportunity for extending knowledge of coral reefs into the nations. The speech was closed with an appreciation to the host prefecture, Okinawa, and the concerned agencies.

The text of Ms. Ishii's statement is attached as Annex I of this report.

- ◇ Mr. Masahide Ota, Governor of Okinawa Prefecture

He expressed gratitude from the host prefecture to the audience and the staff of the concerned agencies for attending the International Coral Reef Symposium. He provided a brief overview of Okinawa by explaining its geographical location and climate, its richness in biological-diversity in the corals and the related organisms as more than 99% of reef species are housed in the sea around Okinawa, its culture as an island surrounded by coral reefs, and its history. He then expressed a significance of Okinawa, being the host of this international workshop, in which the conservation and sustainable use of coral reefs would be discussed. He expressed regret that Okinawa's coral reefs in recent years has been degraded by environmental disturbance induced by various factors, and that no substantial impact by prefectural measures taken against such factors has been successful. He hoped for success in this workshop, and he concluded his speech by thanking the Environment Agency and other concerned agencies for the effort paid for this workshop.

The text of Mr. Ota's statement is attached as Annex I of this report.

2. Keynote Lectures

- ◇ Dr. Richard Kenchington, ICRI Coordinator

He first thanked the hosting agencies, and went on to discussed the present status of coral reefs in the world. He indicated that the growth of fish catch has stagnated.

He explained that the anthropogenic activities have depreciated and destroyed greatly the coral reefs and the related ecosystems, which also resulted in an economic crisis, and emphasized that the solution to the problem is to take the "action" proposed in the ICRI supported by governments and international agencies. In providing the background of ICRI, he described past achievements -- adoption of "Call to Action" in Dumaguete City, Philippines, adoption of "Framework for Action", promoted awareness of the importance of conservation of coral reefs through the programs discussed in many regional workshops. The concept of the ICRI was developed in the United States and further developed at the conference of small island developing states in Barbados. The ICRI is founded on four fundamental objectives to utilize integrated coastal management, capacity building, research & monitoring, review mechanism of the effectiveness of management.

He introduced the immediate tasks in this year being the promotion of various programs to conserve and increase awareness of coral reefs in local communities of each region and the establishment of a global coral reef monitoring network. Another immediate task, he said, is to develop the human and financial resources, to determine the priorities, to plan programs and projects, and to act on those.

He advised first to determine the program priorities for coral reef conservation, and to discuss strategies to obtain financial resource. He considered that those priorities should be based on a long-term prospective with a comprehensive coverage of the ambient ecosystems and the related organisms, and that the action on such stand is what is required to achieve in this workshop.

- ◇ Dr. Makoto Tsuchiya, Professor, University of the Ryukyus

He addressed a significance on understanding the coral reef ecosystem in order to be able to answer the

question, "why their preservation is necessary" in this lecture, and introduced the outline of it.

He suggested that there are seven primary functions of coral reefs. 1) fishing grounds, 2) home for coexistence of diverse species, 3) environmental purification, 4) landscapes, 5) disaster prevention, 6) intermediary in the recycling of carbon dioxide, 7) site for education and research. He stated that the function of the coral reef as a fishing ground was the most important due to its economic significance, and that the well-protected coexistence of a variety of organisms in coral seas was necessary for a stable fish catch.

He explained the mechanism of it by exemplifying a case of lobsters, illustrating the relation between the stable harvest and protecting their habitat with an extensive range of food.

To illustrate the mechanism of environment purification, another function that the coral reef has, he explained that there are organisms living in reef which feed on plankton or toxic substances, and that the corals excrete mucus to protect themselves when eroded red soil flows into the sea and cover them and the mixture of mucus and silt (sand) would be the food for other marine animals (they filter the sand in digestion). He suggested that coral reefs take in carbon dioxide and accumulate calcium to form reefs, which would eventually house the diversified species and offer rich fishing grounds.

He introduced the cases of the reforestation in Erimo-cho (Hokkaido), Berded Goby in Okinawa, some protected areas in Egypt and in the Great Barrier Reef to emphasize that the conservation of coral reefs should be integrated with the conservation of land based ecosystems such as forest and river as a whole.

In closing, he said the only solution to this problem in Okinawa is to develop effective land utilization plans, and recommended that we take steps toward peaceful coexistence between man and nature with while considering different perspectives.

3. Panel Discussion

Dr. Kenji Konishi, coordinator of the Symposium, first introduced the panelists who were Ms. Kim Looi Ch'ng, Planning Officer for the UNEP RCU/EAS, Mr. Ikuo Nakamura, Underwater photographer, Mr. Huminori Nishime, Okinawa Environmental Analysis Center and Mr. Hajime Ikeda, Fisherman of Yaeyama Islands.

After introducing the panelists, Dr. Konishi started the discussion phase of the day and asked panelists to make comments. The following is a synopsis of the comments of the panelists.

Mr. Ikuo Nakamura: He showed his works as a photojournalist in the waters of Okinawa, especially around the Kerama Islands, and said how harmoniously the corals and related organisms are living together and how maliciously the development projects are destroying this harmony.

Ms. Kim Looi Ch'ng: She pointed out the common problem among SA countries being the sectarianism of governmental institutions which makes the approach to coral reef conservation unfocused and fragmented. She then introduced the approaches of the UNEP to help regional programs using slides.

Mr. Fuminori Nishime: He stated that sensible development education, environmental education, technical education are important to promote "utilization and management of coral reefs", and introduced some local activities and plans. He also emphasized that in conducting such activities, the participation of local residents is required.

Mr. Hajime Ikeda: He mentioned that the outbreak of *A.planci* and land-based developmental works have devastated the coral reefs of the Okinawa where once very rich fishing grounds. As a fisherman, he said it is his responsibility to protect coral reefs, and hoped that the whole nation will share the responsibility to protect this treasure.

After Panelists gave their comments, audience was given the opportunity to give theirs.

Q & A

Q: Is there a need to educate the officials of national and local governments who are engaged in developmental works?

Q: Is there a need to develop some educational programs on coral reef conservation to be passed on to the next generation?

Dr. Kenchington: It is necessary to develop capacity building programs as well as educational programs through the international network to increase public awareness for coral reef conservation.

Ms. Ch'ng: Explained UNEP's role in educational programs in different regions.

Mr. Nakamura: Stated that no tension towards conservation of coral reefs has been observed among Okinawa prefectural government and Okinawan citizens. Through education, it is necessary increase environmental consciousness from childhood.

Q: Political body should be blamed for red soil erosion, and the prefectural government must conduct the survey.

Q: How about a zoning system in using the resource?

Q: Introduced a case where a construction cement plant was canceled because of the protest made by the local community.

Q: Introduced one of the activities of the World Wide Fund for Nature Japan at Shiraho Beach.

Q: What is the relationship between a overfishing and the outbreak of *A.planci* in Great Barrier Reef? What is the impact of pontoons to the environment?

Dr. Kenchington: Suggested a cyclic outbreak of *A.planci*, and that the expansion of the scale of Flowing Runway may influence water current.

Q: About the conservation of tidal zone?

Q: About the contribution of divers and fishermen to the conservation of Great Barrier Reef?

Dr. Kenchington: Introduced a successful system between fishery agents, tourist industry, recreational industry, and state (local) government in cooperation.

Q: About educational activities for fishermen in Indonesia?

Dr. Wilkinson: The fundamental issue depends on each individual and not the government.

Q: How a coral reef conservation activity will be promoted without the economy being the first priority.

Ms. Kim: She introduced a case in Malaysia.

(After all of the comments from each panelist, the coordinator made a final comment and closed the discussion.)

II. Workshop

17 February 1997

1. Opening Remarks

- ◇ Mr. Hiroshi Sawamura, Director-General of the Nature Conservation Bureau, Environment Agency of Japan

He addressed the opening of the ICRI Second Regional Workshop for the East Asian Seas in representing the organizing committee. He reported that the Symposium on the previous day was successful. He said that the first Workshop has adopted a Regional Strategy according to the principle of the ICRI, and encouraged the participants of the second Workshop to achieve such goals as implementation of the Regional Strategy, establishment of a network for GCRMN, and promotion of various activities for IYOR. The text of Mr. Sawamura's statement is attached as Annex V of this report.

- ◇ Dr. Seisho Higa, Director of Department of Environment and Health of Okinawa Prefectural Government

He welcomed the participants to the Workshop as a representative of the hosting prefecture. He described Okinawan geography which nurtures coral reefs, culture, and history as a part of international exchanges in East Asia, and expressed how meaningful and honorable for Okinawa to be the host of this workshop. He said that the coral reefs in Okinawa have been degraded by land development, outbreak of Crown-of-Thorns Starfish, and red soil erosion, and hoped for a fruitful outcome of this meeting. The text of Dr. Higa's statement is attached as Annex VI of this report.

- ◇ Dr. Ian Dight, UNEP

He first thanked the Japanese Government and Okinawa Prefectural Government for hosting the workshop. He reported the successful progress made in their Regional Seas Programs, having held 5 regional workshops last year including the East Asian Seas workshop in Indonesia, and having been requested by the Governing Council of UNEP to continue to play an active role in the development, implementation and coordination of regional activities under ICRI. He identified the five global priority needs such as establishment of multi-stakeholder partnerships. He encouraged the audience by informing them of the upcoming regional workshops in many other regions.

The text of Dr. Dight's statement is attached as Annex VII of this report.

- ◇ Dr. Richard Kenchington, ICRI

He gave a background of ICRI, and stated the importance of coral reefs as the source of economical and environmental capital. He said that an objective of ICRI activities is to create a shock to the senior decision-makers. He emphasized that after having been successful in obtaining public attentions in these days, the Actual Action driven internally by the community is needed as the outcome of this workshop as well as the conciliation between policy-makers and researchers. He suggested that IYOR is a valuable component in promoting collaborative work for ICRI objectives.

The text of Dr. Kenchington's statement is attached as Annex VIII of this report.

2. Nomination of Chairperson

The Secretariat nominated Dr. Kenji Konishi, the coordinator of the Symposium, as the chairperson for this workshop. The participants supported this nomination.

3. Adoption of Agenda

The workshop discussed the draft agenda, and adopted it with some minor amendments. The agenda of the workshop is attached as annex IV of this report.

4. Introduction of IUCN

◇ Mr. Paul Holthus, IUCN

He highlighted IUCN as a non-governmental organization which links between science and management with the partnership of multilateral organizations and the membership of several countries and non-governmental organizations. He said IUCN also facilitates networking of the marine protected areas to provide information on such subjects as endangered species. The network can help promote regional activities on coral reef issues, provide regional information, develop nodes, and improve coastal management. The text of Mr. Holthus's statement is attached as Annex IX of this report.

5. Introduction of GCRMN

◇ Dr. Clive Wilkinson, GCRMN Coordinator, AIMS

He defined GCRMN (Global Coral Reef Monitoring Network) as the foundation to provide people with information needed for integrated coastal management, capacity building, and research & monitoring. He explained that the network is established by linking existing organizations and people through nodes (sub-nodes) instead of creating a new organization and that this helps to provide training program (bio-physical, social-economical aspects), partnership, and coordination & development for management of coral reefs, and aims to create the integration/collaboration of science, management and community. The text of Dr. Wilkinson's statement is attached as Annex X of this report.

6. Introduction of ReefBase 2.0

◇ Dr. John McManus, ICLARM

He first explained what ICLARM is, and introduced ReefBase released last year. He explained how large the database system has grown and is expected to be. He said ReefBase facilitates management of coral reefs by providing data to a wide range of people through global CD-ROMs and the Internet. It is a user-friendly system where the user can obtain reef information such as benthic ecology, reef management, harvest, and the stresses on each reef. Each data item indicates the source of the data. He also explained about Aquanaut Survey Method by which volunteer divers can provide reef information. An Update on ReefBase is attached as Annex XI of this report.

7. Presentation of Country Reports

Each country reported their current progress on Regional Strategy. A current report on the progress of regional strategy in each country was presented by the representatives of each participating country.

Australia reported that governmental initiative and programs took effect for sustainable use and conservation of coral reefs.

Brunei, though no extraction of corals was occurring, said that the major threats to corals would be the land development.

Indonesia reported the governmental approaches and the effort to organize the community-based prospective plans for coral conservation.

Japan reported the overall coral protection activities and its international contributions through training courses and on-site research assistance.

Korea reported the involvement of governmental agencies for coral conservation, proposed educational programs, and the researches done so far.

Malaysia reported the legal support for coral conservation, educational programs, effort for the successful IYOR and research activities.

Myanmar reported the undesired status of corals despite the governmental efforts, made a strong appeal for capacity building, and on its experience with a national park.

The Philippines reported the various on-going governmental initiatives, better institutionalization of programs, and networking through Philippine reefs.

Singapore reported the regulatory measures and international protocols adopted in the country, and a variety of educational programs University initiated researches.

Thailand introduced a community-based program, and reported educational programs, an integration of conservation and other industries, supported by scientific basis.

Vietnam reported the progress in legislation and existing needs for educational programs both for officials and communities, and agreed with a sub node in the shared sea area.
Country reports are attached as Annex XIII of this report.

8. Presentation by UNEP/ROAP and Hong Kong University of Science and Technology

- ◇ Mr. Mitsuo Usuki, UNEP/ROAP reported UNEP's role on regional activities of ICRI. After explaining UNEP's activities on environment assessment programme in Asia and the Pacific and sub-regional Environmental Fora in East Asia, he mentioned that UNEP/ROAP would continuously support to facilitate regional cooperating initiatives in the field of marine environment and coral reef protection. The text of Mr. Usuki's statement is attached as Annex XII of this report.
- ◇ Dr. Gregor Hodgson, Hong Kong University of Science and Technology reported briefly on Reef Check, a survey method involving participation of recreational divers. He explained that Reef check is one of the biggest single IYOR activity, involving 100 or more teams from dozens of countries with surveys of more than 300 reefs.
With survey method, he mentioned two goals that were awareness raising and information obtaining on coral reefs.
Finally he emphasized that he could answer the question after five years survey: What is the health of the world's reefs.

9. GROUP SESSION AND ADOPTION OF THE REPORTS OF THE WORKING GROUPS 1,2 and 3

The workshop was divided into three working groups discussing different topics in accordance with the ICRI objectives which are 1) Integrated Coastal Management, 2) Capacity Building, and Research and Monitoring, and 3) Mechanism for Coordination, Monitoring and Evaluation.

On 18th of February, Working Group 1 (Coastal Management) and Working Group 2 (Capacity Building and Monitoring) was held. Each Working Group had some presentations from participants followed by each country identifying their country priorities. After the discussion of the country priority, countries reported their priority at the parallel Working Groups 1 and 2 and discussed regional actions as well as results of the Working Groups.

In working group 1, the need to set a networking (regional or international) to exchange the various expertise in the study of corals was recognized to promote integrated coastal management. The group suggested some projects such as integrated management by countries sharing boundary, establishment of a trainer network linked to NETTLAP or UN programs, and the community-based management training programs.

Some projects concerning capacity building to formulate strategies for Integrated Coastal Management and Marine Protect Area development were discussed in working group 2. As a result, the group met several agreements such as the role of COBSEA through EAS/RCU as a facilitator of capacity building, or training needs for managers by countries such as Japan (JICA) and Australia in technical and socioeconomic aspects.

On 20th of February, the Working Group 3 (Mechanism for Coordination, Monitoring and Evaluation) was held. Working group 3 actually was a joint of working group 1 and 2 to report the result of the discussion of each group and to discuss EAS UNE GEF strategic action programs and GCRMN establishment.

At the plenary session, the record of the discussion of the Working Group 1,2 and 3 was adopted. The record is attached as appendix XV

10. ADOPTION OF THE OKINAWA DECLARATION

The steering committee provided the draft of the Okinawa Declaration and submitted it to the workshop. The participants reviewed and discussed the draft of the Okinawa Declaration. After some minor amendments, it was adopted by the workshop.
The text of the Okinawa Declaration is attached as Annex XVII of this report.

11. CLOSURE OF THE WORKSHOP

Each member of the steering committee, Dr. Clive Wilkinson of GCRMN, Mr. Mitsuo Usuki of UNEP, Ms. Kim Looi Ch'ng of UNEP, and Dr. Ian Dight of UNEP, made his or her comments and thanked all of the participants for their patience and commitment which made this workshop successful. Finally, Dr.

Kenji Konishi, the chairman of this workshop, thanked all of the members of the managing committee, steering committee, host prefecture, Okinawa, and the participants for their tireless efforts and dedication, and declared the closure of the workshop.

ANNEXES

SYMPOSIUM

ANNEX I

Opening Address of Ms. Michiko Ishii, Minister of State, Director-General of the Environment Agency

I wish to extend my greetings to all participants in the International Coral Reef Symposium "Symbiosis with the Coral Reefs, the Ocean's Tropical Forest".

Often referred to as the "tropical forests of the seas", coral reefs are homes to a rich variety of sea life. We humans also enjoy the rich fishing grounds they provide, as well as their recreational benefits.

Despite this, we have lost 600 thousand sq. km. of corals, a total 10% of the world's coral reefs, have been lost, with another 30% forecast to deteriorate over the next 20 years. Coral reef conservation is now widely recognized as one of most important issues faced by the global community.

In the face of such conditions, Japan has applied the Japan-U.S. Common Agenda as the launch point of its coral reef conservation program. In 1994, the International Coral Reef Initiative (ICRI), a comprehensive and international framework to promote conservation and sustainable use of coral reefs, was jointly established with the U.S. and Australia.

Japan has been particularly active in the conservation of reefs in the East Asian seas. ICRI held its First Regional Workshop for the East Asian Seas in March, 1996 in Bali, Indonesia. Now, this Second Regional Workshop for the East Asian Seas has come about thanks to the support of various agencies in Okinawa.

This symposium, held as part of the Second Regional Workshop for the East Asian Seas, is hoped to provide opportunities for the general public to learn about the current state of coral reefs in Okinawa and the world, as well as about the various conservation efforts being made. It will also provide an opportunity for us all to consider how we might better coexist with the coral reefs which nurture a variety of forms of life.

In closing, I express my appreciation for the support and cooperation extended by the Okinawa Prefecture and other involved agencies in making this symposium at the Okinawa Convention Center possible.

ANNEX II

Opening Address of Mr. Masahide Ota, Governor of Okinawa Prefecture

We are proud and happy to welcome the many dignitaries and interested parties from throughout Japan and around the world who have come to attend the International Coral Reef Symposium held as a segment of the Second East Asian Seas Regional Workshop of the International Coral Reef Initiative.

Sited at the south-western end of Japan, Okinawa Prefecture is an island group with an oceanic climate and a rich subtropical land environment. The surrounding waters hold almost ninety percent of all coral reefs in Japan, and form an environment with a rich assortment of marine life. Both as a living basis for local communities and as valued recreation areas, the coral reefs are near and dear to the people of Okinawa. Our ancestors issued forth from the waters of Okinawa's coral reefs to cross to China, the kingdoms of East Asia and to Japan in a network of trade, becoming widely known as a people of peace.

I believe that there is profound meaning in holding this Second East Asian Seas Regional Workshop of the International Coral Reef Initiative in Okinawa Prefecture, with its unique geographical position and history, and in supporting an international program for the preservation and sustainable use of the coral reefs.

In recent years, the coral reefs of Okinawa have been heavily damaged through developmental construction and the Crown of Thorns. Red soil eroding into the ocean has also had an especially widespread impact. While a variety of studies and measures have been implemented to date, they have proved inadequate.

I am hopeful that the interactions and exchanges of opinion expected under the workshop theme of "Symbiosis with the Coral Reefs: The Ocean's Tropical Forest" will result in progressive proposals on future preservation efforts and use of the coral reefs.

In closing, I would like to express my appreciation to the many people who contributed on many levels to this symposium, most notably the Minister of the Environment Agency, Ms. Michiko Ishii.

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ANNEX IV

Agenda

16 February, Sunday (Symposium)

13:00

Registration

13:30

Opening Remarks

- * Ms. Michiko Ishii
Minister of State, Director General, Environment Agency
- * Mr. Masahide Ota
Governor, Okinawa Prefectural Government

Keynote Lectures

- * Dr. Richard A. Kenchington
Global Coordinator, ICRI
"ICRI and International Directions in Reef Conservation."
- * Dr. Makoto Tsuchiya
Professor, University of the Ryukyus
"Coexistence of Coral Reefs and Human Beings:
Why We Need to Conserve Coral Reefs."

Panel Discussion

- * Dr. Kenji Konishi (Coordinator)
Professor Emeritus, Kanazawa University
- * Ms. Kim Looi-Ch'ng
Planning Officer, UNEP EAS/RCU
- * Mr. Hajime Ikeda
Fisherman of Yaeyama Island
- * Dr. Richard A. Kenchington
ICRI Executive Office
- * Mr. Ikuo Nakamura
Underwater Photographer
- * Mr. Fuminori Nishime
Okinawa Environmental Analysis Center
- * Dr. Makoto Tsuchiya
Professor, University of the Ryukyus

17 February, Monday (Plenary Session)

10:00 Registration

10:30 - Opening Remarks

- * Mr. Hiroshi Sawamura
Director-General of the Nature Conservation Bureau, Environment Agency of Japan
- * Dr. Seisho Higa
Director-General of the Environment and Health Department, Okinawa Prefectural Government
- * Dr. Ian Dight (UNEP) " Review on Activities of ICRI"
- * Dr. Richard Kenchington (ICRI)

Nomination of Chairperson

Chairperson: Dr. Kenji Konishi

Adoption of Agenda

Introduction of IUCN

- * Mr. Paul Holthus (IUCN)

Introduction of GCRMN

- * Dr. Clive Wilkinson (GCRMN Coordinator, AIMS)

Introduction of ReefBase 2.0

- * Dr. John McManus (ICLARM)

13:30 - 15:00 Presentation of Country Reports

- * Australia, Brunei Darussalm, Indonesia, Japan, Malaysia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Vietnam
- * Mr. Mitsuo Usuki (UNEP/ROAP): Cooperation by the UNEP ROAP with the East Asia Seas regional activities of ICRI
- * Dr. Gregor Hodgson
Hong Kong University of Science and Technology

Reception (hosted by Okinawa Prefectural Government)

18 February, Tuesday (Group Session)

Working Group 1 (Coastal Management)

Chairperson : Dr. Richard Kenchington (ICRI)
co : Mr. Shigeki Wada (Environment Agency of Japan)
Rapporteur : Mr. Abdul Khalil bin Abdul Karim (Malaysia)

09:00 - 12:00 Presentation of Reports and Discussions

1. The Natural Park System of Japan
* Mr. Masaki Nagaoka
(Assistant Director, National Park Div., Environment Agency)
2. COREMAP
* Dr. Suharsono
(Senior Researcher, Research and Development Center for Oceanology, Indonesian Institute of Science)
3. Promotion of Okinawa's Development and Coral Reef Conservation Practice
* Mr. Toshihiko Shiozawa
(Director-General of the Development Construction Division, Okinawa Development Agency)
4. Domestic Action Plan
* Mr. Ramate Sukpum
(Coastal and Marine Resources Sub-Division, Natural Resources and Environmental Management Div., Office of Environmental Policy and Planning, Government of Thailand)

Working Group 2 (Capacity Building and Monitoring)

Chairperson : Dr. Porfirio Alino (Philippines)
co : Dr. Clive Wilkinson (GCRMN)
Rapporteur : Mr. Jeffrey K. Y. Low (Singapore)

09:00 - 10:30 Presentations and Discussions

1. Introduction of Training Programme of JICA
* Mr. Yasumitsu Araki (Okinawa International Center, JICA)
2. Introduction of International Year of the Reef (IYOR)
* Mr. Paul Holthus (IUCN)
3. Introduction of the IYOR activities in Japan
* Mr. Tasuku Uno (Chairman, Marine Parks Center of Japan)
4. Work of the Aquarium in the Conservation of Coral Reef
* Mr. Kouchi Tonosaki
(Director (Park), Okinawa Development Agency)
5. Assessing the Global Health of Coral Reefs: Reef Check 1997
* Dr. Gregor Hodgson
(Hong Kong Univ. of Science and Technology)
6. The National Survey on the Natural Environment of Japan
(Distribution Map of Coral Reef)
* Mr. Mamoru Koarai
(Survey and Planning Officer, Office of Natural Environment Survey, Environment Agency)
7. GCRMN Regional Nodes in East Asia Seas
* Dr. Clive Wilkinson (GCRMN)

10:30 - 12:00 Country Discussion

13:30 - 15:00 Working Group (1 and 2)

- Reporting of Country priority programme/projects
- Regional actions

16:30 - 17:00 Plenary Session

- Discussion of outcomes of Group 1 and 2

19 February, Wednesday (Excursion)

(Drafting Group prepared for draft of Okinawa Declaration)

20 February, Thursday (Group Session and Plenary Session)

Working Group 3 (Mechanism for Coordination, Monitoring and Evaluation)

Chairperson : Mr. Mitsuo Usuki (UNEP)

co : Dr. Suharsono (Indonesia)

Rapporteur : Dr. Chou Loke Ming (Singapore)

09:00 - 12:00

Discussion

1. Presentation of country and regional reports
(output of working groups)
2. EAS UNEP GEF Strategic Action Programme
3. GCRMN
 - Framework
 - Coordination
 - Financing

14:30 - 17:00

Plenary Session

- Discussion and Adoption of Okinawa Declaration

17:30 -

Press Conference

18:30 -

Farewell Party (hosted by the Environment Agency)

ANNEX V

Opening Address of Mr. Hiroshi Sawamura, Director General of the Nature Conservation Bureau, the Environment Agency of Japan

I am honored to address the opening of the International Coral Reef Initiative Second Regional Workshop for the East Asian Seas as the representative of the Organizing Committee.

Originating in a common agenda for bilateral Japan-U.S. cooperation that spanned the globe, the International Coral Reef Initiative gave rise to the Call to Action and its corresponding Framework for Action from the workshop at Dumaguete City, Republic of the Philippines in 1995. The First Regional Workshop for the East Asian Seas convened in Bali, Indonesia last March, and adopted a Regional Strategy which has proceeded to yield steady results. For our own nation of Japan, our own focus is on action that promotes the conservation of the coral reefs in this particular region.

This is the International Year of the Reef. The understanding and cooperation of the general public, most especially those who live in this area and live closely intertwined with the coral reefs, are essential if we are to conserve coral reefs. To this end, we felt a need for deeper awareness of the people of Okinawa and the citizens of the world to focus on the condition of the worlds reefs and the importance of their conservation. Therefore, we arranged for the international coral reef symposium as a part of this workshop. The Symposium included the exchange of a wide spectrum of ideas on coral reefs, and I am sure, promoted a better understanding of the goals of the International Coral Reef Initiative.

Today, in convening the Second Regional Workshop for the East Asian Seas, we believe the central agenda to be

1. working toward implementation of the Regional Strategy adopted last year, promote the implementation of coastal management practices in each nation.
2. Establish a node for the Global Coral Reef Monitoring Network in this region.
3. Promote a variety of activities that enhance greater promotion of the International Year of the Reefs.

We have every hope for diverse and active debate, and for significant advances in coral reef conservation to emerge from today's gathering of government representatives, experts and representatives of international organizations from around the world.

In closing, as a member of the Organizing Committee, I reaffirm our resolve to support today's workshop in any way to secure meaningful results and hereby ask for the collaboration and cooperation of all participants. May I also express my hopes you will explore and enjoy the local color and heritage of this prefecture of Okinawa.

ANNEX VI

Statement of Dr. Seisho Higa, Director - General of the Environment and Health Department, Okinawa Prefectural Government

Good morning ladies and gentlemen. I am pleased to give an address this morning as representing the Okinawa Prefecture and I would like to give a hearty welcome to all of you attending the International Coral Reef Initiative the Second East Asian Seas Regional Workshop. Thank you very much for coming to Okinawa.

Today we convene in a prefecture called Okinawa which is located at the south of Japan and has over 160 islands with subtropical oceanic climate and subtropical fauna and flora, and with the environment of diverse and varied interest including the beautiful coral reefs that attract attention throughout Japan and from other areas.

Once known as an independent kingdom of the Ryukyus, this island used its geographical location as a great advantage and established trade networks with South East Asian countries including China and Thailand. Today again the Prefectural government is dedicated to using this geographical relationships to promote greater understanding of culture, technology and other exchanges with other countries.

It is this background that makes us specially pleased to host this East Asian Regional workshop for the ICRI of this area, especially because of its focus on dedication and conservation of corals.

In most recent years throughout Okinawa, we have had a wave of predation by the Crown-of-Thorns Starfish and our coral has been severely damaged by the red soil erosion. In order to preserve our oceans for the future and to maintain sustainable management that allows sustained use, we feel that this is the central core policy which must be pursued by our prefectural government.

I am most pleased that here will be much debate and much discussion in this workshop and wonderful ideas that I am sure we can adapt to these islands.

In closing, please let me express my appreciation to all the people from the Environment Agency, from overseas, and other areas for their support in this workshop today. Thank you very much.

ANNEX VII

OPENING REMARKS ON THE INTERNATIONAL AGENDA FOR CORAL REEFS

by

Dr. Ian Dight

Coordinator, Aquatic Biodiversity
United Nations Environment Programme (UNEP)
Nairobi, Kenya

Distinguished Representatives of the Government of Japan,
Delegates from the East Asian Seas region, and
Colleagues,

Firstly, on behalf of Ms Terttu Melvasalo, Director, Water Branch and Ms Elizabeth Dowdeswell, Executive Director of UNEP, I wish to thank the Government of Japan for hosting and sponsoring this Second ICRI Regional Workshop for the East Asian Seas. I also wish to welcome delegates to the meeting.

The Regional Seas Programme of UNEP has been particularly instrumental in the design and implementation of the International Coral Reef Initiative (ICRI) at the regional level. During 1995 and 1996, five regional ICRI workshops were held globally in association with the Regional Seas Programme (RSP); in Jamaica (for the Tropical Americas), Fiji (for the South Pacific), Maldives (for South Asia), Indonesia (for East Asia) and Seychelles (for Eastern Africa and the western Indian Ocean).

The first ICRI Regional Workshop for the East Asian Seas agreed that the UNEP Regional Coordinating Unit for the East Asian Seas Action Plan (EAS/RCU) in Bangkok was the most appropriate institute for coordinating the ICRI East Asian Seas Programme. This decision of the workshop was subsequently supported by the Coordinating Body for the East Asian Seas (COBSEA) in December 1996 when it endorsed the Report of the ICRI Regional Workshop for the East Asian Seas. Most recently, the Nineteenth Session of the Governing Council of UNEP adopted decision CRP.28 which not only recognized the important role of UNEP but, more specifically, requested the UNEP Regional Seas Programme "to continue to play an active and leading role in the development, implementation and coordination of regional activities under the International Coral Reef Initiative". This decision of the Governing Council was co-sponsored by, amongst other nations, Australia, Indonesia, Japan, the Philippines and Thailand. It was further endorsed by Korea, Myanmar and Vietnam, amongst others.

International policy for the conservation and management of coral reefs is relatively well developed and, for this reason, it is important to strengthen and, where necessary, build an effective linkage to this global policy framework. The efforts of ICRI must be linked, for example, to those of the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA) and the Convention on Biological Diversity (CBD). The GPA aims to prevent the degradation to the marine environment by reducing, controlling and eliminating pollution from particular source categories, including sewage, heavy metals, oils (hydrocarbons), nutrients, sediments and litter, by setting specific targets. Under the CBD, the conservation and management of marine and coastal biodiversity will be the first focal area to be addressed in a comprehensive manner. The first meeting of experts on marine and coastal biodiversity of the CBD will take place in Indonesia from 7-10 March 1997. At this meeting, priorities will be identified and a three-year workplan formulated.

In light of the preceding, I urge delegates to this Second ICRI Regional Workshop for the East Asian Seas to build upon the work of the first ICRI workshop and the decisions of Governments in their deliberations, and to focus on achieving practical and concrete outcomes that will further efforts for the conservation and management of coral reefs.

The regional ICRI Workshops that were held in Jamaica, Fiji, Maldives, Indonesia and Seychelles each developed their own approach to coral reef conservation and management. In all cases, workshop participants engaged in participatory debate, and working groups were formed around specific themes that were determined by the regions themselves. The global priority needs for the protection and management of coral reefs and associated ecosystems that were identified through the five regional ICRI Workshops are listed below. These needs represent elements of a strategy to address the priority threats to coral reefs and implement the actions

identified in the relevant regional action plans and strategies.

Global Needs:

- Development and/or establishment of multi-stakeholder partnerships involving the public and private sectors, NGOs, the scientific community and, in particular, local communities;
- Improved coordination at the national level;
- Improved information and data for management, particularly as they relate to human activities, and the establishment of appropriate monitoring programmes;
- Development and strengthening of public awareness and education programmes; and
- Development of sustainable financing strategies and mechanisms.

As reflected in the first of the priority needs above, it is becoming increasingly evident that Governments alone cannot be expected to bear the full responsibility for managing and protecting the environment. Governments are increasingly finding themselves under pressure from their own citizens and the international community to enhance participation by civil society in resource management. Not only do Governments not have the resources to make development and/or resource management projects work in most cases, but there is growing consensus that this approach is not appropriate and that those stakeholders who are directly affected by management decisions need to be involved and have ownership of decisions which directly affect their livelihoods.

The issue of partnerships is fundamental to effectively addressing most of the priority needs that have been identified through the ICRI process. It is pleasing to see that at least two of these needs - improved information and data for management, and the establishment of appropriate monitoring programmes - and - development and strengthening of public awareness and education programmes - are on the agenda for this workshop. These are the focus of the Global Coral Reef Monitoring Network (GCRMN) and International Year of the Reef (IYOR) respectively.

Participants of this workshop should be aware that they are not alone in their endeavors to reverse the apparent global decline in the health of coral reefs. For example: next week there is to be a regional coral reef workshop for the Eastern African and Western Indian Ocean region at which assessment and monitoring, and the establishment of regional networks will be a principle topic; in March 1997, there will be a national coral reef initiative to address the plight of Brazilian coral reefs, and to establish a national assessment and monitoring network; and both the South Pacific and Caribbean regions have embarked on a coordinated IYOR campaign. There is currently unprecedented momentum to reverse the apparent global decline in the health of coral reefs, but concrete actions will be required by national governments and civil society as a whole.

And, in conclusion, I would like to wish you all the very best for a productive and successful workshop.

ANNEX VIII

Abstract of the Statement of Dr. Richard Kenchington, Coordinator of ICRI

The International Coral Reef Initiative (ICRI) is an international partnership of countries, non-government organizations and international agencies which aims to maintain the biological diversity, resources and values of coral reefs. ICRI has been successful in raising awareness of the need for, and means to protect and sustainably use coral reefs around the world. In its next phase the partners in ICRI must build on this foundation. This will require continuing leadership of the partner nations in ICRI to ensure action is taken to implement ICRI's objectives. The urgency is for action not talk. We can easily fall into a pattern where we spend time and money on workshops and program design but not on action in the field. We need to review progress, share techniques and to build networks but we need action, projects and progress.

ANNEX IX

Opening Remarks of Mr. Paul Holthus, IUCN

IUCN would like to thank the Government of Japan for organizing and supporting this Second ICRI East Asian Seas Workshop and the Prefecture of Okinawa for hosting the Workshop.

IUCN is a unique organization which links over 70 governments, over 150 government institutions and almost 700 non-government organizations (NGOs) into a common global body - the World Conservation Union - focused on the conservation and sustainable use of biodiversity. IUCN also has special working relationship with UN and multi-lateral organizations, e.g. UNEP, UNDP, IOC and World Bank. In the East Asia region, members of IUCN include the governments of Japan, China, Malaysia, Korea and Vietnam, as well as government agencies in these, and other, countries of the region. In addition, there are many NGOs in the countries of the region which are IUCN members.

We would thus like to highlight the need to move forward on integrated action to conserve and manage coral reefs, e.g. action which integrates the efforts and interests of government with those of the rest of society, action which integrates science and management, action which integrates formal institutions and communities.

Building on previous commitments and activities in addressing coral reef issues and coastal management around the world, IUCN joined in the establishment of ICRI, being the only founding member of ICRI that represents the non-governmental community. At the first ICRI meeting for the East Asian Seas region (Bali, 1996), I described the role of IUCN with regards to coral reefs in the EAS region. These include direct activities of the IUCN Secretariat through our small regional office and numerous country programmes and offices in the region. In addition, we also seek to foster, facilitate and communicate the coral reef conservation and sustainable use programmes and activities of IUCN Members (i.e. governments, government agencies, NGOs) and to support and coordinate the work of IUCN Commissions in the region (i.e. global specialist networks, such as those on protected areas - including marine protected areas (MPAs), and on species survival - including coral reef related species such as marine turtles, dugongs, sharks and coral reef fish.

IUCN is building its commitment to the EAS region through an expanded capacity and presence in the years to come. The IUCN Marine and Coastal Programme will continue to provide leadership, coordination and support for IUCN coral reef related efforts in the EAS region in the context of IUCN's participation in ICRI. In particular, our efforts will focus on:

- the International Year of the Reef (IYOR), for which Reef Packs have been made available to the participants of this workshop;
- the development of the Global Coral Reef Monitoring Network (GCMRN), with a particular interest in the social, economic and cultural aspects of assessment and monitoring;
- the conservation and sustainable use of coral reef ecosystems through regional and country projects and activities, especially those concerned with MPAs and ICM.

The outputs of this Workshop will assist IUCN to determine how we can best work with the countries and institutions of the region and ICRI on coral reef conservation and sustainable use. We look forward to the results of your discussions.

Thank you

ANNEX X

THE GLOBAL CORAL REEF MONITORING NETWORK IN THE EAST ASIAN SEAS REGION

Clive R. Wilkinson

Coordinator

Global Coral Reef Monitoring Network, c/o Australian Institute of Marine Science, PMB #3, Townsville MC, 4810, Australia

The Global Coral Reef Monitoring Network (GCRMN) is a response to large scale damage and destruction of coral reefs around the world. This fulfills the Research and Monitoring component outlined in the Framework for Action document developed by the International Coral Reef Initiative at the Dumaguete meeting in June 1995. The GCRMN aims to improve the conservation, management and sustainable uses of coral reefs. It is cosponsored by IOC(UNESCO), UNEP and IUCN and co-hosted by AIMS and ICLARM, Manila. The East Asian Seas region will be a significant component of the global network, with the aim of integrating current and future efforts to assess the biophysical status and trends in the ecosystems and socioeconomic uses of the resources. This region is one of the largest with probably the greatest area of coral reefs, which are also at the centre of global biodiversity.

The GCRMN will build on the strong existing capacity that has already developed in many countries of the Region, and will aim to assist other countries reach that standard, through training and provision of equipment. Much of that capacity was developed during the ASEAN-Australia Living Coastal Resources project between 1984 and 1994.

OBJECTIVES OF GCRMN

The GCRMN aims to improve management and sustainable conservation of coral reefs for people by assessing the status and trends in the reefs and how people use and value the resources. It will do this by providing many people with the capacity to assess their own resources within country, regional and global networks, and then to spread the word on reef status and trends.

These will be achieved through strategic objectives that link people and existing organizations to monitor biophysical and social, cultural and economic aspects of coral reefs within interacting regional networks. This will involve strengthening the existing capacity to examine reefs by providing a consistent monitoring program, that will identify trends in coral reefs and discriminate between natural, anthropogenic, and climatic changes. The results will be disseminated widely at local, national, regional, and global scales as annual reports on coral reef status and trends to assist environmental management agencies implement sustainable use and conservation of reefs. The data will also aid preparation of predictive global climate change models for the GOOS Coastal Zone Module.

GCRMN OPERATING PRINCIPLES

The GCRMN will emphasize the involvement of local communities in monitoring with equal emphasis on biophysical as well as social, cultural and economic data. Wherever possible, the GCRMN will use existing organizations and networks, integrate existing monitoring programmes, and maintain flexibility to incorporate different methods of monitoring, other than the recommended methodology. Much of the monitoring will be in current or planned Marine Protected Areas and adjacent unprotected areas. The Network will be responsive to reef users and provide information back in an understandable format.

GCRMN STRATEGIES

The region contains a wide range of reef types from oceanic atolls to narrow fringing reefs close to land with high sediment runoff.

The reefs will be monitored along line transects, assessing easily recognizable lifeforms and fish, especially commercial or recreational species. As people gain more experience, monitoring will be upgraded to species level using the same methods. Local communities will be questioned on their use and knowledge of reef resources and how management may be improved.

Existing or planned Marine Protected Areas (MPAs) will be amongst the main monitoring sites, to provide data on the resources and effectiveness of management. This will be coordinated with the World Bank, IUCN/CNPPA, GBRMPA Global Representative System of Marine Protected Areas project for site selection and questions asked by management.

Monitoring data will be used to generate annual summaries of reef status and all summary data provided will be stored in ReefBase (ICLARM, Manila).

Two special monitoring projects will be supported by the GCRMN: a Pilot Monitoring Programme undertaken simultaneously by research institutes around the world to give a snapshot of reef status; and the development of a tourist monitoring programme, coordinated through tourist operators. The Reef Check project being undertaken for the International Year of the Reef is an excellent example of such an approach and it is anticipated that a continuation of this project will constitute a component of the GCRMN into the future.

GCRMN NODES

The GCRMN will function through Nodes which are functionally independent, but collaborate and interact with adjacent Nodes and Regions. Coordination will be assisted through the GCRMN Coordination office and ReefBase in ICLARM. Within the East Asian Seas region there is considerable experience and capacity, therefore there may be many Nodes. Some of these have offered to assist neighboring countries. The designation of Nodes will be decided by countries in the EAS region at this meeting.

It is anticipated that each Node will contain trainers and database operators to train other trainers and assist in database operations within the country and possibly in adjacent countries. Funding for each Node will be requested from country, development bank or agency donors, with the responsibility for monitoring funding devolving towards countries after about 5 years. Each country will maintain a country database for GCRMN activities and use this to prepare country report on the status of their coral reefs.

The GCRMN will have three interlinked levels. The largest will be by local communities (fishers, schools, colleges, and tourists) performing basic monitoring over broad areas. Moderate coverage, but at higher resolution and detail, will be performed by tertiary trained personnel in Government environment or fisheries departments and universities. These are the people who will act as trainers to implement monitoring in communities. Node trainers will monitor key national sites, while also providing training to local communities. There may be some high resolution assessment over small scales by scientists and institutes currently monitoring reefs for research. There is considerable monitoring in progress by institutes around the world and many of these institutes are being contacted through a GCRMN Pilot Monitoring Project currently under way.

At the First East Asian Seas Regional workshop in Bali, 1996, countries of the region presented country status reports, which included reports on the status of their reefs and on the in-country capacity to conduct programmes to monitor the status and trends in their reefs. After that workshop, the countries were asked to indicate their willingness and capacity to join the GCRMN to provide information on the degree of training and support required within the region. Countries were also asked on the most appropriate structure of Nodes and coordination mechanisms. In this, the Second Workshop hosted by the Government of Japan in Okinawa, proposals to implement the GCRMN will be suggested and applications for funding and implementation will then be developed.

GCRMN PRODUCTS

The GCRMN has been established to provide data for better management of coral reefs, by harnessing the interest and skills of all users in reef assessment and management. Two major products are envisaged: data on reef status and trends; and people trained to observe reefs closely for cause and effect relationships. All this will create a greater awareness for the need to implement integrated coastal management of these valuable resources.

METHODS

The GCRMN will feature simultaneous gathering of biophysical, social, cultural and economic data. Biophysical monitoring will be based on a recommended 'standard methodology': manta tow (or equivalent for a broad perspective); line intercept transect with initial identification at 'lifeform' level (or equivalent transect method); and fish censuring, with emphasis on fisher target species and indicator fish, like butterfly (chaetodont) fish. These methods were developed during the ASEAN-Australia Living Coastal Resources project. Socioeconomic parameters will focus on use of reef resources and community knowledge and attitudes to reef management, along with demographic data and legal and economic parameters. Preparation of the manual for these methods is in the planning stage.

MONITORING SITES

Country Nodes will select their sites for monitoring based on local conditions and capacities. Ideally these sites will include assessing some of the following comparisons: 'pristine' reefs remote from human populations compared to reefs under a range of human impacts; reef flats, reef slopes, both windward and leeward; reefs at geographic extremes e.g. high latitudes, within high and low salinity concentrations; reefs from high to low biodiversity; reefs experiencing the range of storm effects (from equatorial reefs to tropical storm belts at Latitudes outside 7 degrees), the range of oceanic turbulence and current influences, and the range of land runoff; sites monitored in the past, especially those with continuous monitoring data or monitored many years ago; reefs in Marine Protected Areas and adjacent, unprotected reefs; and reefs that have been extensively damaged (natural or human causes). This last category is particularly important to determine the ability of reefs to recover and will require methods aimed at detecting the survival of newly recruited corals.

These sites should cover the complete geomorphologic range of reef types and locations, from fringing reefs close to land to oceanic atolls. The sites should permit discrimination of changes and trends between natural coral reef impacts (storms, fresh water runoff) to global climate change (sea level rise, increased temperatures and radiation, changes in rainfall and current patterns) and anthropogenic pressures (pollution, increased sediment loads and over-exploitation).

GCRMN OUTPUTS

There will be tangible and intangible outputs: data on reef status and trends generated by communities, governments and research institutes; methods manuals, annual reports and major reports coinciding with the International Coral Reef Symposia every 4 years; an interactive, international network of trained people monitoring coral reefs; and greater awareness by users, public, governments and international agencies, of the need for reef management and conservation. The most important outcomes will be interactive partnerships between communities, resource managers, governments, and scientists to enhance management and conservation of coral reefs.

DISCUSSION

The GCRMN is an ambitious project aimed at providing data to enhance reef management. It will proceed incrementally through the development of in-country capacity and then increasing monitoring activity as experience is gained. The methods and protocols have been largely drawn from studies performed within the East Asian Seas region during the past 15 years. The degree of success will largely depend on the international community providing funds to support reef monitoring, as there is considerable willingness amongst a large reef

user and research community to assist. Simultaneously there will be other projects providing more data, including monitoring by tourists and volunteer divers. The GCRMN will complement and assist many other projects in the region (e.g. on biodiversity) by providing capacity to assess resources and their status.

ACKNOWLEDGMENTS

The GCRMN is particularly grateful to the Government of Japan for the assistance and support provided to the ICRI process through the Bali Symposium in March 1996 and for sponsoring this Okinawa Symposium in February, 1997. It is through such support that the GCRMN can make progress towards initiating a network of people working towards sustainable conservation and management of coral reefs. We look forward to continued cooperation and support to implement monitoring of coral reefs through this network in the EAS region.

ANNEX XI

An Update on ReefBase

by M.C. Ablan, ICLARM

The ReefBase 1.0 CD-ROM was first released in the 8th International Coral Reef Symposium in Panama last June. Since then, over 300 copies of the CD-ROM have been distributed to individuals and institutions. The has been updated and revised and will be ready for its second distribution in June 1997.

To date, there are close to 7,019 reefs listed in ReefBase. Of these reefs 1,400 have information on benthic ecology. Management information is available for 496 reefs, harvest information for 1,525 reefs and stress data for 2,114 reefs. There are currently 2,390 entries in the ecology tables, 2,188 entries in the harvest tables and 3,439 records of stresses on reefs. ReefBase has 6,975 entries on dive locations, operators, sites, lodgings and tours for about 1,500 reefs. On each display form, we include the citation for the reference from which obtained each piece of information.

Much work is going into improving the query systems which allow users to arrive at summaries of the information found in the numerous tables. The report and query systems are being tied up more closely to the WinMap, the mini-GIS in ReefBase. This way users may obtain a display of the areas where reefs that fulfill criteria set through the query system.

We have added a Threats and Management Recommendation table where information on the reported dangers to a reef and the recommended courses of action are listed. Data is continually added to the other tables on protected areas, socioeconomic indicators of reef use, as well as the list of institutions, experts and monitoring programs working on the various aspects of coral reefs.

Since ReefBase began in November 1993, our aim has been to come up with summary information on the reefs of the world by gathering information on various aspects of coral reef and reef resources. As we gather this information, we want to make it available to a wide range of audience. Thus, we have put the ReefBase 1.0 reef list and references tables on-line through the World Wide Web. These features may now be accessed through the ReefBase homepage at <http://www.cgiar.org/iclarm/resprog/reefbase.html>. Users may search the references list table by typing relevant phrases in the spaces provided or choose from drop down lists. These pages will be regularly updated as we cut new versions of ReefBase.

We have also added information on the Aquanaut Survey Method (ASM) onto the web page. The ASM is a means for volunteer divers to help gather information on the status of a reef during their dives. The data gathered through collaborative efforts with dive groups will be made available to others through this web site. We appreciate the comments, suggestions and donations of both materials and pictures which we have been receiving. We look forward to receiving more of these from you. Please get in touch with us through:

ReefBase

International Center for Living Aquatic resources Management M.C.P.O. Box 2631, 0718 Makati City Philippines

PH: 632-8180466 or 8175255

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ANNEX XII

Collaboration of UNEP/ROAP to the ICRI Activities in East Asia Mitsuo Usuki UNEP Regional Office for Asia and the Pacific

1. Introduction

As every participant to today's meeting recognizes that this year 1997 is the year of 5 years period review after the Earth Summit, the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. The post-UNCED period provided UNEP with new challenges which emphasized that sustainable development can only be achieved by incorporating environmental considerations in socio-economic and development policy. I would, therefore, like to reiterate, in particular, that the Chapter 40 of Agenda 21 highlighted the need for:

- a) enhanced accessibility of integrated environment and development Information; and
- b) enhanced national capacity to deal with such information in decision-making and policy-setting.

2. UNEP's Environment Assessment Programme

In response to these challenging demands for information about environment and development, UNEP reviewed its monitoring, assessment and reporting functions. As a result, UNEP's Environment Assessment Programme has been extensively reshaped to focus more specifically on the needs and capabilities of its users. The Programme consists of the Global Environment Monitoring System (GEMS) including the state of the environment (SoE) reporting Unit, the Global Resource Information Database (GRID), UN system-wide Earthwatch Coordination, and environment and natural resource information networking (ENRIN). The Environment Assessment Programme of UNEP has been nowadays leaded and coordinated by Mr. Takahiko Hiraishi, Japanese senior colleague, since mid-1996.

3. Environment Assessment Programme for Asia and the Pacific (EAP-AP)

In Asia and the Pacific Region, the programme is implemented through the facility of UNEP Environment Assessment Programme for Asia and the Pacific (EAP-AP) situated within the Asian Institute of Technology (AIT), Bangkok, Thailand, former name of which was rather popular one "GRID-Bangkok". The programme has 3 components:

- (i) Assessment and reporting;
- (ii) Data management; and
- (iii) Institutional capacity building and servicing.

EAP-AP is implemented by our Nepalese colleague, Mr. Surendra Shrestha, in association and overall guidance from Regional Office for Asia and the Pacific (ROAP) and the substantive supervision from Environment Assessment Division of UNEP's Headquarters in Nairobi.

Among various environmental scopes, activities in the field of marine and coastal zones management have been under way in collaboration with the East Asian Seas Regional Coordination Unit (EAS/RCU) of UNEP to which my colleague, Ms. Kim Looi Ch'ng, belongs.

To guide the programme implementation, EAP-AP has developed a conceptual environmental assessment framework which show a systematic process of gathering bio-physical and socio-economic data through decentralized networks of key agencies with the mandate to collect and to provide the data. These data will be integrated through the use of modern information technology and later be converted into critical and useful information through the development and use of indicators and indices focusing on emerging issues. Using modern tools and techniques, data and information will be further processed into specific inputs for state of the environment reporting and assessment, decision-making, policy analysis and planning which may hopefully contribute to one of the main proposals of this ICRI forum, the strategic plan of the Global Coral Reef Monitoring Network (GCRMN).

Assisting our EAP-AP in implementation of the programme are five subregional organizations with which EAP-AP has established very important partnership and close working relationship for maintaining effective networking system in Asia and the Pacific region on sub-regional basis. These organizations include:

- (i) Association of South East Asian Nations (ASEAN) based in Jakarta, Indonesia;
- (ii) International Centre for Integrated Mountain Development (ICIMOD) based in Kathmandu, Nepal;
- (iii) Mekong River Commission (MRC) to be based in Phnom Penh, Cambodia;
- (iv) South Asia Cooperative Environment Programme (SACEP) based in Colombo, Sri Lanka; and
- (v) South Pacific Regional Environment Programme (SPREP) based in Apia, Western Samoa.

EAP-AP has also sought the support from other donor programmes to undertake complementary and/or joint activities. Sound relationships have been established with UNDP and the Asian Development Bank (ADB) in the region. German Agency for Technical Cooperation (GTZ). Danish International Development Agency (DANIDA) and the Finnish International Development Agency (FINNIDA) are making significant contributions to environment information capacity development at national levels. In addition, other collaborative activities are being undertaken with other agencies including the Economic and Social Commission for Asia and the Pacific (ESCAP), Asian Disaster Preparedness Centre (ADPC), International Union for the Conservation of Nature (IUCN), International Rice Research Institute (IRRI), CGIAR and International Crop Research Institute for the Semi-Arid Tropics (ICRISAT).

Over the past several years, the synergy created by these partnerships and collaboration facilitates EAP-AP's accomplishment of the following:

- a) Continuing capacity building activities in 16 countries in the Region involving technology transfer through training and provision of hardware and software to Bangladesh, Bhutan, Cambodia, Fiji, Indonesia, India, Lao People's Democratic Republic, Maldives, Myanmar, Nepal, Pakistan, People's Republic of China, Sri Lanka, Thailand, Viet Nam and Western Samoa;
- b) Continuing assistance in the evolution of a decentralized national network of distributed environment information system in each of the 16 countries mentioned above with the environment and/or planning agency acting as the focal point;
- c) Establishment of 7 GIS training facilities, i.e. a regional training facility located at AIT, 3 sub-regional and 3 national facilities;
- d) Continuing development of core data sets of both bio-physical and socio-economic data at various levels, i.e., 1:1 million scale at the regional level, 1;250,000 scale at the sub-regional level and 1;100,000 or 1;50,000 scale at the national/urban levels.
- e) Database development and data management support to the 1995 regional SoE Report implemented by ESCAP.
- f) Assistance in the preparation of national and subregional State of the Environment (SoE) reports, which include reports for:
 - (i) ASEAN Region;
 - (ii) Greater Mekong Subregion;
 - (iii) South Asia; and
 - (iv) South Pacific which were completed by December 1995.

As far as the Regional Office for Asia and the Pacific of the UNEP is concerned, our closely coordinated working relations between ICRI forum through UNEP's Environment Assessment Programme for Asia and the Pacific may contribute a lot to the development and maintenance of the recommended Global Coral Reef Monitoring Network (GCRMN).

4. Sub-regional Environmental Fora in (North) East Asia

4-1. NEAREP

As I already mentioned, there already exist five sub-regional environmental organizations institutionally established bases in ASEAN, ICIMOD, Mekong River Basin, South Asia and South Pacific sub-regions all of which would be able to implement environmental monitoring networks including GCRMN. Since there is a blank area of sub-regional environmental institution in Asia, we, UNEP in collaboration with ESCAP, UNDP and ADB, is now on a process of facilitating discussions and decision-making fora in environmental cooperation in (North) East Asian Sub-region.

One of the largest forum of which might be the North-East Asia Regional Environment Programme (NEAREP). Most recently in September 1996 at Ulaanbaatar, Mongolia, the 3rd meeting of senior officials on environmental cooperation in North-East Asia under the NEAREP forum was held. The meeting adopted the "Framework for the North-East Asian Subregional Programme of Environmental Cooperation" which was a unique and remarkable event and a significant milestone in the Subregion as the six countries of North-East Asian Subregion, i.e. China, DPR-Korea, Japan, Mongolia, Republic of Korea and Russian Federation, for the first time came to a consensus and adopted an agreement on subregional environmental cooperation.

The meeting decided that the Senior Officials Meeting on Environmental Cooperation in North-East Asia (SOMECEA) would act as Governing Body for the Programme and provide overall policy guidance as well as project coordination and management. The Senior Officials Meeting would be held, in principle, annually in one of those participating countries on a rotating basis and would work towards step-by-step practical institutional and financial arrangements of the Programme, as appropriate.

The meeting requested that, in the interim period, the secretariat support to the Senior Officials Meeting would continue to be provided by the ESCAP secretariat in collaboration with the United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), the Asian Development Bank (ADB) and the World Bank and other relevant institutions pending the final decision on the future institutional arrangements of the Programme.

The meeting entrusted the Government of the Republic of Korea to negotiate and pilot a draft decision seeking financial and technical support for the Programme at the 19th Session of the Governing Council of UNEP in January 1997 on behalf of the participating Governments, and which decision was successfully adopted re-affirming,

- (i) technical and financial support to the fourth meeting of senior officials on environmental cooperation in North-East Asia scheduled to be held at Moscow in August/September 1997; and
- (ii) technical and financial support to the priority project proposals under the "Framework for the North-East Asian Subregional Programme of Environmental Cooperation" unanimously adopted by the third meeting, which I already mentioned.

4-2. NOWPAP

Another one of the major activities of UNEP as the coordinating and catalyzing agency targeting to achieve sustainable development being compatible with environmental conservation, which activity formulated the North-West Pacific Action Plan (NOWPAP), successfully adopted by its first Intergovernmental Meeting, 14 September 1994 in Seoul, the Republic of Korea with the attendance of People's Republic of China, Japan, the Republic of Korea and the Russian Federation.

Most recently in November 1996 at Tokyo, Japan, the Second Intergovernmental Meeting on the Northwest Pacific Action Plan (NOWPAP), was convened by UNEP's Water Branch with the attendance of same 4 nations above. The meeting discussed the following main issues:

- (i) Geographical scope of the Action Plan;
- (ii) Financial arrangements for implementation of the Action Plan;
- (iii) Institutional arrangements for implementation of the Action Plan;
- (iv) Programme implementation in the biennium 1997-1998; and
- (v) Implementation of the Global Programme of action for the Protection of the Marine Environment from Land-based activities in the NOWPAP region.

Several decisions were made on such subjects as the NOWPAP Trust Fund arrangements, etc. For instance, the member States reached a consensus on the targeted amount of annual contribution of US\$500,000 and on a tentative contribution scale for contribution from the member States to the NOWPAP Trust Fund in 1997.

We, UNEP, expects further promotion of environmental conservation measures being compatible with sustainable development for the sea and coastal areas of North-West Pacific in cooperation with countries concerned through this Action Plan and also through consorted efforts taken by this forum of ICRI.

In this connection, UNEP wishes the countries of this sub-region of North-East Asia to make use of our mechanism as one of the tools for regional environmental cooperation including conservation and monitoring of the coral reefs of the sub-region.

5. Conclusion

As everybody working in the field of the environment and sustainable development is already fully aware that the major goal of the United Nations Environment Programme should be promoting sustainable development.

The Regional Office for Asia and the Pacific of UNEP, as one of the cosponsoring and/or coordinating organ of ICRI activities in East Asia, will continuously support the objectives of the Workshop and also the collaborative manner in which our organization has worked with countries of the region in cooperation with collaborating agencies so as to facilitate regional cooperating initiatives in the field of marine environment and coral reef protection.

In this context, our organization wishes that the various cooperative initiatives on the environment in this sub-region (refer to the attached table) should be merged in under the umbrella of sub-regional institutional mechanism such as NEAREP in the near future, similar to other sub-regions of ASEAN, South Asian nations as well as of South Pacific nations.

Attached Table: Various Fora/Institutions for Northeast Asian Sub-regional Environmental cooperation

Multi- or Bi-lateral	Intergovernmental Type or NGOs	Meetings and/or Activities
Multilateral, sub-regional & Comprehensive	Intergovernmental ⁽¹⁾ (organized by ESCAP in cooperation with UNEP, UNDP and ADB)	<ul style="list-style-type: none"> * senior Officials Meeting on Environmental Cooperation in North-East Asia; for North-East Asia Environment Programme (NEAREP) <ul style="list-style-type: none"> - 1st Meeting, Seoul, February 1993; - 2nd in Beijing, November 1994; 3rd in Mongolia, September 1996; - 4th in Moscow, Russian Federation, August/September 1997.
	Intergovernmental ⁽²⁾	<ul style="list-style-type: none"> * Northeast Asian Conference on Environmental Cooperation (NEAC) <ul style="list-style-type: none"> - 1st Meeting, Niigata, Japan, October 1992; - 2nd in Seoul, September 1993; - 3rd in Hyogo, Japan, September 1994; - 4th in Pusan, Korea, September 1995; - 5th in Beijing, China, October 1996.
	Non-governmental (typical example)	<ul style="list-style-type: none"> * Seoul symposium: UNCED and Prospect on the Environmental Regime in the 21st Century ('92 Seoul Symposium) <ul style="list-style-type: none"> - Seoul, September 1992 * Symposium on Northeast Asia Environmental Cooperation <ul style="list-style-type: none"> - Irkutsk, August 1993 * Asia-Pacific Environmental Symposium, Seoul, September 1995
Multilateral, sub-regional & Sectoral	Intergovernmental ⁽¹⁾ (Marine Environment) organized by Water Branch of UNEP	<ul style="list-style-type: none"> * Northwest Pacific Action Programme (NOWPAP) <ul style="list-style-type: none"> - 1st Experts Meeting: Vladivostok, October 1991; - 2nd Experts Meeting: Beijing, October 1992; - 3rd Experts Meeting: Bangkok, November 1993; - 1st Intergovernmental Meeting/4th Expert Meeting: Seoul, September 1994 - 2nd Intergovernmental meeting: Tokyo, November 1996.
	Intergovernmental ⁽²⁾ (Marine Environmental Monitoring)	<ul style="list-style-type: none"> * International Workshop on Monitoring of Marine Environment of Northwest Pacific <ul style="list-style-type: none"> - 1st Workshop, Hyogo, Japan, September 1994; - 2nd Workshop, Toyama, Japan, October 1995.
Multilateral, sub-regional & Sectoral	Intergovernmental ⁽³⁾ (Acid Deposition Monitoring)	<ul style="list-style-type: none"> * Expert Meeting on Acid Deposition Monitoring Network in East Asia <ul style="list-style-type: none"> - 1st Meeting, Toyama, Japan, October 1993; - 2nd Meeting, Tokyo, March 1995; - 3rd Meeting, Niigata, Japan, November 1995; - 4th Meeting, Hiroshima, Japan, February 1997.

Multi- or Bi-lateral	Intergovernmental Type or NGOs	Meetings and/or Activities
Multilateral & subregional	Intergovernmental (3)	* Resource, Industry and Environment Working Group of Tumen River Development Programme in UNDP - Helsinki, March 1993.
Bilateral	Intergovernmental (1)	* Korea-China Agreement on Environmental Cooperation * Korea-Japan Agreement on Cooperation in the Field of Environmental Protection * China-Japan Agreement on Environmental Cooperation * Russia-Japan Agreement on Environmental Cooperation * China-Mongolia Agreement on Environmental Cooperation China-Japan Agreement concerning the Protection of Migratory Birds and their Habitats * Russia-Japan Agreement concerning the Protection of Migratory Birds and their Habitats

Note;

- (1) Intergovernmental type 1; Participated by the Ministry of Foreign Affairs, and of Environment
(2) Intergovernmental type 2; Participated by the Ministry of Environment
(3) Intergovernmental type 3; Participated by the Ministry of Environment, and of Industrial Development

ANNEX XIII

Country Reports

Country : Australia

INTERNATIONAL CORAL REEF INITIATIVE - SECOND REGIONAL WORKSHOP FOR THE EAST ASIAN SEAS

DRAFT AUSTRALIAN INFORMATION PAPER

Graeme Beech
Parks Australia North - Biodiversity Group
Environment Australia

Chris Bleakley
External Services Section
Great Barrier Reef Marine Park Authority

INTRODUCTION

This paper has been prepared for the International Coral Reef Initiative (ICRI) Second Regional Workshop for the East Asian Seas. It identifies current issues, priorities and key activities for management, capacity building and research and monitoring.

MANAGEMENT

The responsibility for management of Australia's coastal areas, including coral reefs and related ecosystems, is shared between the Commonwealth, state and local governments. Coastal zone management in Australia is complex because all these spheres of government have legitimate interests and responsibilities in the zone and are carrying out programs relevant to management, research and monitoring, and capacity building.

Governments at all levels are under increasing pressure from the community to deal with coastal issues and no single sphere can manage the coastal zone, including coral reefs and related environments. Management systems are faced with two key issues which constrain the ability to effectively secure sustainable use of the coastal zone :

- fragmented management arrangements based on issue or sectoral management ; and
- the 'tyranny of small decisions', whereby over time a number of decisions that in themselves are not significant accumulate and interact to result in a significant impact on the coastal environment.

These issues are common to many countries. Australia, through the Commonwealth Coastal policy is taking concrete steps towards decision-making that is integrated and takes a long-term or strategic approach to problems. The Coastal Policy identifies area-based management plans involving all relevant government agencies and other interests and the establishment of a long-term strategy for the coast as a practical way of achieving integrated management of coastal and marine resources. This approach involves :

- strategic assessment and integration of significant environmental, economic, social and cultural issues in the area concerned ;
- identification of key issues and development of shared management goals ;
- where necessary, joint action between authorities, agencies and spheres of government to deal with key issues ;
- establishment of continuing arrangements to promote implementation ;
- extensive involvement of the local and regional community, NGOs and the private sector ; and
- effective corporate planning and management within governments, to focus attention and resources on broad strategic issues, outcomes and priorities and to provide the basis for involving and co-ordinating others with

an interest in the area.

Widespread adoption of integrated and strategic approaches by agencies dealing with the coastal zone is recognized as being critical to effective management of coral reefs and related ecosystems.

These principles are already being applied in a number of areas. The Great Barrier Reef Marine Park is recognized as one of the world's first and foremost examples of integrated marine management. Other examples include the Torres Strait Protected Zone, Kakadu National Park, Ningaloo and Shark Bay Marine Parks (and adjacent Hamelin Pool Marine Nature Reserve), Solitary Islands Marine Reserve, Jervis Bay National Park, and Coringa-Herald, Ashmore Reef, Mermaid Reef, Lihou, and Elizabeth and Middleton National Nature Reserves.

Some of the key coastal management initiatives being pursued in Australia include :

- Coasts and Clean Seas Initiative - This \$100 million initiative will tackle pollution problems, significant threats to biodiversity and protect the environment in Australia's coastal areas. As part of this initiative Australia is working towards the development of a comprehensive and integrated Oceans policy.
- Coastal and Marine Planning Program - is promoting cooperation between the three spheres of government to facilitate the development of integrated multiple-use management plans. The aim is to minimize the impacts of adhoc and uncoordinated development and land-based pollutants.
- National Representative System of Marine Protected Areas - aims to ensure the protection and management of representative samples of marine ecosystems, habitats and species in a national system of marine protected area.
- Coastcare - a community action program supported by the Commonwealth and state governments which supports projects such as beach and dune rehabilitation, weed control, flora and fauna surveys, preparation of management plans, monitoring and education.
- Endangered Species Program - the aim of this program is to prevent further extinction of Australia's flora and fauna, and to restore endangered species and ecological communities to a secure status in the wild. Action plans to aid the recovery of cetaceans and dugongs have been developed.
- National Vegetation Initiative - loss of native vegetation and the conservation of many species is a major concern in Australia. The National Vegetation Package will tackle the protection of remaining native vegetation and sharply raise the level of revegetation activities. Catchment protection and stabilization will be a key part in reducing sediment inputs into marine areas.
- National Wetlands Program - this program aims to ensure Australia meets its obligations under the Convention on Wetlands of International Importance (Ramsar Convention) and to promote the conservation of wetlands by encouraging and assisting with the development of suitable management practices which will lead to wise use of wetland resources.
- Dugong Rescue Strategy - aimed at arresting and reversing the decline in dugong numbers in the Great Barrier Reef. Includes the listing of nine Interim Dugong Protection Areas intended to form the basis of a dugong sanctuary system.

CAPACITY BUILDING

All decision makers require sufficient expertise to ensure that coastal resources are wisely used. A range of education, training and information exchange skills are required for integrated management. Among those who need these skills are local, state and Commonwealth officers, the resource development sector and community groups.

Local government plays a critical role in coastal zone management in Australia ; many decisions which affect coral reefs and related ecosystems are made at the local level. However, many local authorities have limited access to financial resources and expertise, and find it difficult to support a significant range of technical skills to deal with many of the resource management issues which arise.

All jurisdictions have a role to play in ensuring that managers have the capacity to deal with the dynamic and cross-sectoral nature of the issues relevant to management of coral reefs and related ecosystems. Co-operation will lead to more effective use of limited resources, and in some cases cost savings.

All people who use the coastal zone, including coral reefs and related ecosystems, need to play an active role in maintaining the quality of these environments.

This involvement not only extends the ability of society to physically manage the problems caused by its use of resources, but also helps to spread awareness of coastal management issues and to engender a sense of community responsibility.

Community groups provide an important source of voluntary help in managing Australia's coastal zone resources. Interest in, and affection for coast are widely shared in the community. An important issue in seeking to manage coral reefs and related environments is how to galvanize the volunteer spirit and enthusiasm in community, and to harness it to help implement management initiative.

Aboriginal and Torres Strait Islander peoples have a special relationship with and interest in coral reefs and related ecosystems. Their needs and special interests need to be considered in developing management initiatives.

Some of the key initiatives underway in Australia to address capacity building include ;

- Coastal Action Program - this programs is supporting a range of capacity building activities including the development of codes of practice with industry and user groups (eg recreational fishing, aquaculture, engineers, planners, surf-lifesaving institute, tourism) as well as follow-up training to support implementation of the codes. The program is also providing short training courses to focus on state and local government and practitioner level training needs, in consortiums with local government and states.
- Marine and Coastal Community Network - the network is a tool for education, communication and consultation with sectors such as commercial and recreational fishing, local government, recreational users, schools, tourism and others involved or interested in marine management.
- Professional Development for Teachers - The Commonwealth Marine Program is providing professional development for teachers as a means of increasing studies on marine and coastal issues in schools.
- Stated Co-operative Assistance Program - provides funds or expertise to State and Territory Agencies for research and management across the spectrum of species and habitats, information exchange and strategic planning, Marine wildlife conservation has been a priority for this program.
- CouncilNet - A communication networking tool for local government to increase opportunities to access information in integrated environmental management. While the initial pilot project was funded by the Commonwealth, the network is now being run by local government.
- Coastnet - involves the establishment of internet discussion groups to enable continued discussion and access to information concerning coastal issues and integrated management.

Australia recognizes that it has a role to play in capacity building at the international and regional levels. Australia is part of the Asia / Pacific region and has a strong interest in promoting conservation of the shared marine and coastal biodiversity and resources of the region.

Australia is supporting capacity development through the ICRI partnership. Since the First Regional Workshop held in Bali Australia has taken on the role of hosting the international secretariat to ICRI. The Secretariat will be based with the Great Barrier Reef Marine Park Authority in Townsville for two years until mid-1998. In its term as Secretariat Australia is aiming to work with other ICRI partners to maintain the global profile of ICRI and also to develop an increased regional focus for the Initiative.

As part of its role as Secretariat for ICRI, Australia is an active supporter of the Pacific Year of the Coral Reefs Campaign being developed and coordinated by the South Pacific Regional Environment Programme (SPREP). This campaign, part of the 1997 "International Year of the Reef", aims to raise awareness of the importance, and means of achieving protection and sustainable use of reefs and related environments in the Pacific. Australia will be undertaking a variety of other initiatives as part of the "International Year of the Reef".

Australia is also promoting capacity development at the regional level through collaborating with partner governments to develop a regional strategy for implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA).

RESEARCH AND MONITORING

Over the past 25 years Australia has developed major programs of research and monitoring in coral reef and related environments. Despite this, inquiries into coastal management have repeatedly found that there are serious deficiencies in the knowledge available for management of coastal resources and in the arrangements for coastal resource managers' access to the information that does exist.

There are major gaps in the availability of geographically comprehensive and long-term scientific information on the marine environment in general. Without this it is difficult to accurately assess its condition, to identify trends, and to design and assess management programs. Major gaps are:

- lack of long-term research and monitoring of Australia's marine environment: difficulties in establishing long-term research and monitoring programmes include high cost of marine studies; difficulties in obtaining long-term funding for research and monitoring; lack of coordinated data acquisition and storage; and lack of standardized, cost-effective, statistically based scientific sampling techniques and indicators.
- lack of applied scientific knowledge on the marine environment local government environmental managers are seeking information on local marine environments and simple, descriptive maps and inventories.
- lack of scientific understanding of the functioning of marine ecosystem at scales relevant to human use and management.

Information on the 'state' of coral reefs and related ecosystems, and the ability to detect changes, is necessary in order to determine whether uses are sustainable. As part of wider programmes which address ecosystems across the coastal zone, long-term monitoring of coral reefs and related ecosystems, including the development and maintenance of baseline inventories, is essential.

Data from monitoring should be capable of meeting more immediate management needs. Results from monitoring should be directly relevant to managers, and for this reason managers, not just scientists, must be closely involved in their design.

Although a significant amount of research is being carried out there remains a need to co-ordinate this effort to ensure that the research is directed at priority areas and is effectively meeting the needs of those who are managing coastal resources.

Some of the key activities for research and monitoring include:

- Coastal Monitoring Program - a national network of monitoring sites is to be established to improve the availability and accessibility of information relevant to planning and management. In the short term the program is supporting the application of monitoring as a management tool through assisting stakeholders to review monitoring and develop integrated monitoring programs.
- Coasts and Clean Seas Initiative - will be targeting key sources of nutrients and sediments in ocean outfalls and stormwater as well as introduced marine pests and marine biodiversity conservation.
- Australian Coastal Atlas - is a component of the Commonwealth Coastal Policy comprising an electronic atlas drawing together combined data holdings on the coastal zone. The Atlas is to be made available on the World Wide Web using internet technology.
- National Water Quality Management Strategy - this strategy emphasizes the development of integrated, multiple-use strategic plans for the protection and enhancement of coastal and marine environments.
- Waterwatch Program - this program provides a national focal point for community-based water quality monitoring activities encouraging all communities in a catchment to work together.

- National Marine Information System (NATMIS) - is being developed to provide a comprehensive scientific database on the marine environment. The system involves a national network of marine agencies all making their information available in a mutually supportive way.
- Research and monitoring on the Great Barrier Reef - major research and long-term monitoring programs are carried out by the Great Barrier Reef Marine Park Authority, the Australian Institute of Marine Science and the Great Barrier Reef Cooperative Research Centre.

CONCLUSION

While Australia's coral reefs and related ecosystems are facing various human pressures a variety of government initiatives and programs have been developed. The combination of these initiatives taking effect at the "reef level", the development of the ICRI principles and practices at both regional and local levels and an increased community awareness and commitment means conservation of the biological base and the ecologically sustainable use of these ecosystems is now a realistic aspiration.

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Country : Brunei Darussalam

Country - A small tropical country in the island of Borneo

■ Area : 5,765 sq. km.

■ Population : 1/4 million

Coral Reef - Total Coral areas only 45 sq.km.

■ One major comprehensive study in 1992

recorded : 186 species from 72 genera of hard corals

: Responsible Agency : Department of Fisheries within the Ministry of Industry and Primary Resources (MIPR)

: No marine park at the moment, but proposals to establish marine parks in some of the coral reef areas.

- There is no extraction of corals occurring in Brunei Darussalam
- There is no destructive fishing carried out in the coral reef areas
- Under the completed ASEAN-US - Coastal Resources Management Program, an integrated Coastal Zone Management Plan was produced.
- The major threats to coral reef areas in Brunei Darussalam are/will be the on-going land development.
- Another threat, though not major, is industrial development. However, under the MIPR, industries are controlled/selected.
- Capacity Building
 - Training in various forms are required - reef monitoring, enforcement, management, etc.
 - Public awareness is still lacking though this will be addressed extensively once the marine parks are established.
- Research and monitoring
 - Reliance of outside assistance makes the research and monitoring capability of coral reef in the Brunei Darussalam either non-existent or on a low scale.

Country :Indonesia
Drafter :Suharsono, :Research and Development Center for Oceanology-LIPT
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Management

Under Presidential decree No. 77/1996 the Government of Indonesia has established a National Marine Council (Dewan Kelautan Nasional). The National Marine Council has a responsibility to coordinate 19 national, four provincial and six district government agencies which are involved in managing marine resource including exploration, and exploitation, marine security and management issues. At the National level Indonesia has established a number of regulation, policies and principles which relate to marine and coastal management but they do not directly provide for integrated marine and coastal management measure. The Government of Indonesia has recognized the need to manage effectively the nation's marine ecosystems and proposed Coral Rehabilitation and Management Program. Coral Rehabilitation and Management Program are underway to develop of provincial government and local community responsibility for integrated marine and coastal management.

Ecologically sustainable use of coral reefs of Indonesia through a program of rehabilitation and management is a very important initiative for the future development of the nation, the well being of the coastal people of Indonesia and the health of the reefs and associated ecosystems on which they depends. There are several possible strategic approaches to achieve the over all goal of the program. For example one approach is to enforce the laws which forbid to destructive fishing practice and illegal fishing by focusing on target groups of people who cause the threat to the reefs e.g.: fisherman who practice blast fishing. This approach attempt to stop and prevent particular groups from fish bombing and cyanide fishing. Indonesia has already embarked on a strategy of decentralizing decision making to the provincial and district levels of government. The government recognizes that without community partnership of responsibility, management and conservation of coral reefs, will fail though decentralization of responsibility to provincial and district levels of local government, it is envisaged the role of the central government will still be crucial. The central government will still have responsibility to the establishment of national coordinated integrated policies and legislation for overall guidance and coordination in the implementation of the program across the whole of Indonesia and for continued funding. The strategic approach will be to provide genuine opportunities for the local management responsibility for planing monitoring, regulation and protection of coral reefs. Poverty and population pressure became one key factor in the current destructive practices on coral reefs exploitation. The alleviation of poverty through village economic development activities is the provision of an alternative economic opportunities and access to credit to encourage and assist communities to improve their livelihood and move away from sustainable and destructive exploitation practices.

The public awareness program currently on going is to build increased understanding of the function, nature and economic importance of coral reefs. This includes understanding the effects of rational utilization and available the alternatives for income generating, so as to reduce pressure on the resources. Initially the targets group of awareness programs include key decision makers in the government and private sector as well as communities, in the longer term key target will include teachers and children.

The government recognize that there are existing or recent traditional marine tenure and conservation practice which support for marine conservation. Traditional laws have the potential for supplementing conventional management and enhancing conservation of particular resources as well as whole reefs areas. The government of Indonesia recognizes and encourages of those practices and gives possible legislative support for them, especially traditional laws which are encourages and supports ecologically and economically sound management.

Capacity Building

Coastal and marine ecosystems are interconnected and interdependent, while the human systems which are responsible for the use and management of coral reefs and other marine resources tend to be uncoordinated sectorally and often have conflicting policy objectives. Therefore the building of alliances and coordinated networks of people from different institutions is essential. For this purpose the establishment of coral reef information centers is now in preparation to provide a sound information base for management decision making and community understanding.

The collection, analysis, storage and dissemination of information will be essential to support other initiatives. This information include status of coral reefs, locally based management, public awareness, human resources development, institutional strengthening and policy development.

The information from coral reef information network will be made available to all interested people. In the meantime communication with international networks will also be established.

Locally based management will take advantage of institutional strengthening activities, improved human resources development and improved access to capital and infrastructure to provide the local communities with the ability to manage coral reef ecosystems. These will be use of facilitator to assist the development of community capacity to manage their own marine resources. The use of management plans to prescribe the sustainable uses and the development of alternative source of income for reef recourses dependent families. Promoting locally based management will depend on the active participation and capacity of individuals and groups of people in the institutions, NGOs and local communities. A variety of skills and knowledge will be required at all levels including technical skill, management skill and organizational skill.

Human resources development can take at least two forms, namely training programs and learning process developed through informal meeting and social gathering. The training will be implemented at national, provincial and local levels of government institutions, as well as at NGOs and community groups. The first step is to determine the skill and competence levels of the people before devising training programs to fulfill the level. Enforcement is a key activity necessary to complement and support other interventions. Without effective enforcement locally based management will fail. The basic strategy is to develop the capacity of the enforcement agencies to carry out enforcement of laws against illegal fishing and collecting, by provision of boats, and field equipment as well as training for the personal at the district level. The involvement of sectoral institutions and related units at the provincial and district level is important. Forestry, Fisheries, Tourism and Mining departments will individually and collectively be assisted and encouraged to integrate marine and coastal law enforcement into their sectoral policies.

Research and Monitoring

Research of relevance to the management of coral reefs and other marine ecosystem is being carried out by Research and Development Center for Oceanology - LIPI and by universities covering both biological and social sciences. Currently research on the biology and ecology of coral reef conducted by the Research and Development Center for Oceanology are focused on priority issue such as : Recruitment, reproduction status and growth of corals, information on the status of coral reefs and other related ecosystems. Meanwhile Research and Development Center for Sociology is to study the socio-economic aspect of the communities that depend on reefs for their living. The negative impact of destructive fishing tectonic such as blasting and cyanide, the effects of recreational activities in small coral reefs island.

The Research and Development Center has established permanent transects in 7 different locations in West Sumatra, Seribu islands, Lombok island, South Sulawesi, Bunaken Islands and Ambon Island. The aim of this activities is to have a time series data for long term monitoring of the coral reefs in order to detect possible changes of coral reef communities and to determine whether uses are sustainable. In the meantime trainings are conducted to develop on the standardization of monitoring techniques data collection, storage and management on date about 400 peoples had been trained to asses the condition of coral reef in the seven localities mentioned earlier. The localities here referred to as nodes will become components of national networking for the coral reef information center.

Country : Japan

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1. Coastal Zone Management

(1) Marine conservation Areas

The following marine park sites have been designated under the Natural Parks Law.

/ 68 marine park sites in 11 national parks, covering 1,156.8 hectare

/ 66 marine park sites in 13 quasi-national Parks, covering 1,156.8 hectare

Total : 134 marine park sites in 24 national and quasi-national parks

In accordance with the Nature Conservation Law, one marine special area covering 128 hectare has been designated.

(2) Inclusion of Shiraho Coastal Area into the national park

Shiraho Coastal Area of Ishigaki Island in Okinawa is known to support the colony of blue coral *Heliopora coerulea* that is one of the largest colonies in the world. Although installation of new air port in Shiraho was approved under the Civil Aviation Act in March, 1982, the Okinawa Prefectural Government stated to change the location for the airport to the east of Kara-dake hill in April, 1989, responding to the nationwide campaign against the project in view of conservation of their coral reefs.

In responding to this action, the Environment Agency expressed to consider the designation of the applicable area as a marine park area in the national park to appropriately conserve the coral reefs if the coral communities of Shiraho is maintained as the result of change of the planned air port location.

After this, however, the plan of Shiraho marine park was not concreted because the location for the airport was not brought to the final decision and further changed to an inland area.

In September, 1996, responding to the statement of the mayor of Ishigaki City, that the coral reefs of Shiraho and northern area of Ishigaki Island should be conserved, Mr. Iwadare, the Director General of the Environment Agency stated to consider the incorporation of the Shiraho area as the part of Ishigaki Island into the national park. The Environment Agency is preparing for designating the Shiraho as a marine park.

(3) Development projects and coral reef conservation

Alteration of lands according to the execution of various projects for advancement and development of Okinawa has caused run-off of red-soil or other soils.

Okinawa Development Agency has implemented public works such as construction of dams and roads with preventing run-off of soils, published documents for performing corrective actions against run-off of red soil, and directed studies on technology for prevention of run-off of red soil.

In harbor construction projects, the agency is conducting survey of actual state of corals, developing technology for coral transplantation and reproduction for the purpose of promoting growth of coral on the artificial structures such as breakwaters and creating beautiful underwater scenery.

(4) Enactment of Okinawa Red-soil Run-off Prevention Ordinance

The Okinawa Prefectural Government enacted the "Okinawa Prefecture Red-soil Erosion Prevention Ordinance" in 1994 for the purpose of preventing water pollution of the sea areas and rivers caused by run-off of red soil. This regulation defines standards for construction and management of red-soil run-off prevention facilities.

(5) Operations for removing crown-of-thorns starfish and other coral-eating marine life

In case of outbreak population of the crown-of-thorns starfish or coral-eating gastropods in marine park areas of national or quasi-national parks, a government subsidy is provided, in addition to prefectural

one, for removal operations conducted by the local government to conserve coral reef scenery of the area.

2. Capacity building

- (1) Training course on conservation and sustainable management of coral reefs conducted by Japan International Cooperation Agency(JICA)

JICA has enforced training course for conservation of coral reefs. This course aims that the officials and technical experts who are in charge of investigation and planning of coral reef conservation in tropical and sub-tropical countries, learn conservation of natural environment and advancement of sustainable management and utilization technology mainly for coral reefs through lectures, practices, and studies and observations. In 1996, seven trainees from the Philippines, Mauritius and other five countries were accepted, and were subjected to 42 day training mainly in Okinawa on the subjects including 1. understanding systems for development for sightseeing and fishery and conservation and management of natural environment mainly of coral reefs, 2. learning techniques for investigation and conservation (recovery, transplantation, etc.) of coral reefs, and 3. mutual understanding theories and practices between Japan and participant countries for conservation, sustainable management and utilization of coral reefs. From 1997, the period of the training will be extended approximately two months to add subjects such as techniques for making educational materials on coral reef conservation.

- (2) International cooperation for the preparation of coral reef management plan

- 1) Preparation of management plan for conservation of the Tubbataha Reefs, the Philippines

The Environment Agency through entrusting to the Marine Parks Center of Japan cooperates in the research of natural environment, state of utilization and management, appropriate actions for conservation and management, and preparation of draft management plan for Tubbataha Reefs that is one of the World Heritage.

As a part of these activities, a brochure describing the importance of the conservation of coral reefs to arouse public awareness of the subject was created, and workshop will be held near Tubbataha Reefs in March, 1997.

- 2) Coral reef conservation in the Kingdom of Tonga

The Environment Agency through entrusting to the MPCJ cooperate in research of environment, state of utilization and management for five coral reef protected areas and proposed protection areas located in northern shallow parts of Tongatapu Island that is the largest island in the Kingdom of Tonga. This research was made by laying stress on studying coral and fish fauna through observations using snorkeling because of lack of this kind of data in this area. Based on the results of this research, a draft management plan of protected areas was prepared.

- 3) Palau coral reef conservation research center

The Japanese Government is examining the idea on establishing a center for studying conservation of coral reef in Asia-Pacific region through cooperation of Japan and US and delegated investigation team consisted of both Japan and US members to Palau.

At the same time, JICA is planning to accept trainees as a part of raising specialists of this subject.

- 4) Research of plan on sustainable development of tourism in the northern Palawan of the Philippines

To prevent disordered large scale development on tourism which could cause destruction of the coral reefs in Palawan Islands of the Philippines, JICA conducted research of environment and utilization of this area, and created the master plan on sustainable development of tourism to be recommended in this area.

Accepting trainees for this matters is also being examined.

3. Research and Monitoring

(1) Studies on coral reefs

1) Study on sustaining mechanism of coral reef ecosystem and its conservation

The Ministry of Agriculture, Forestry and Fisheries and the Environment Agency have studied coral reefs jointly from 1994. In 1996, three aspects were researched including 1. analysis of effects of environmental stress to coral reefs in the laboratory, 2. analysis of effects of environmental stress to the coral reef ecosystem of, and 3. development of methods for monitoring coral reef alteration.

The Japan Marine Science and Technology Center has started study of coral reef ecosystem in north-eastern part of Ishigaki Island at 1995. The center is planning to seize physical and chemical properties and speed of metabolism of various marine life and water of the coral reefs, and the ecosystem based on the results.

2) Coral reef conservation practices of the Okinawa Commemorative National Government Park Aquarium

Under the Okinawa Development Agency, the Okinawa Commemorative National Government Park (Ocean Expo Park) takes fullest advantage of its especially favorable location in the midst of beautiful, rich ocean waters to advance its work in expanding coral reef conservation, and in breeding and raising large aquatic life since 1975. Conservation of the New Aquarium, which began in 1996, will permit exhibits of living coral ecosystems and promote studies of new technologies of coral reef ecological gardening techniques.

3) Holding workshop

In March, 1996, "The workshop on response of coral reefs to global environmental change" was held by the Science and Technology Agency and the Geological Survey of Japan at Tukuba. Approximately 60 international and domestic participants actively exchanged their opinions on the subjects including coral reef and global environmental change, response of coral reef ecosystem to the change, and other related matters.

(2) Survey of coral reef distribution and creation of the distribution map

1) National Survey on the Natural Environment

As a part of above-mentioned survey, the Environment Agency conducted "the Marine Biotic Environment study (coral reefs)". Based on the results of the survey, coral reef distribution maps were issued at a scale of 1 to 100,000 for Nansei Islands, in the south below Kodakara-jima of Tokara Island chain of Kagoshima prefecture. These maps consist of four sheets. For moat areas, the state of change of coral reefs, life form and coverage of the coral community and substratum have been researched, living corals are shown on this map using three kinds of colors based on the coverage. For the reef margin, manta towing method was used to survey the life form and coverage of coral communities because the margin is too deep to allow analysis of the aerial photos. The results of the study are shown on the maps using lines.

This is the first case of mapping the coverage of whole coral reefs of Japan at a scale of 1 to 100,000. Through this map, it is found that most coral reefs are occupied by coral communities with less than 5 % cover, those with high coverage (over 50 %) are seen mainly around Iheya Island, Kerama Islands, Shiraho of Ishigaki Island, and Kohama Island of Sekisei Lagoon.

2) Understanding detailed distribution of coral reef using remote sensing

The Japan Marine Science and Technology Center studies detailed distribution of coral reef through still photos, video images and observation by diving in Sekisei Lagoon. Based on the data collected through these means, the Geological Survey of Japan will analyses pictures obtained by remote sensing using satellites. It is expected that detailed distribution of the coral reefs can be known

though the analysis.

(3) GCRMN

The Government is examining to establish a GCRMN node in Japan for covering East Asian seas region. For the questions about GCRMN, refer to attached answer sheets. It is planning to make relationships through network among counter parts and researchers. As a part of this activity, there is a movement to establish Japan Coral Society (temporary name).

4. Others

(1) Actions on the International Year of the Reef

The following actions are now being planned relating to the Year

- Holding a symposium on conservation of coral reefs
- Holding a contest for poster appealing conservation of coral reefs
- Holding a contest for underwater photos in coral reefs
- Reef health survey cooperated by divers
- Conducting coral reef eco-tour

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1. Coastal Management

Korean waters have no typical coral reef, being sited beyond the northern limit of stony coral (reef building coral) distribution. Related ecosystem such as mangrove are also absent. However, the sea around Chejudo which is a biggest island in Korea, lying 141 km off the south-west coast of the Korean peninsula and its surrounding islets contain many tropical and subtropical elements such as coral reef inhabitants and specific soft coral communities. According to Song (1996), 97 coral species have been reported from Chejudo. Among them 65 species including 23 hard coral species were found in only Chejudo. The island and its islets should be influenced by Tsushima warm current, a branch of Kuroshio originated in tropic ocean which mainly passes through the island south. The current might transport the elements of tropic waters to the ambient water of this island. Chejudo and its islets provide habitats for unique and diverse tropic flora and fauna as refuge. Presently this little-understood ecosystems in the island have been threatened by water pollution, land development and tourism. Conservation of these ecosystems is one of key issues in Korean marine research.

a) Prohibition of the fisheries which destroy coral reefs;

No special regulation for prohibition of the fisheries at the soft coral areas of Chejudo have been established as of yet.

Korean government prohibits spearfishing and catching fishes and useful invertebrates during their breeding season all the coastal areas of Korea under the Fishery Law.

b) Establishment and management of marine conservation zones;

At present there is no management program or legislation relating to the protection and management of coral beds in the island. Two different concerned groups of marine scientists, officers and underwater photographers carried out two surveys which were fully supported by the Ministry of Culture in 1992 and the Ministry of Environment in 1993 respectively. The main purpose of the surveys was to designate a marine reserve under the Natural Environment Preservation Act established in 1991. The reports of the surveys strongly recommended the establishment of the area of three southern islets as a marine reserve to protect and manage the ecosystems of the islets. After that, although the Ministry of Environment has tried to establish the sea around the islets (13.875 square kilometers) as a Natural Ecosystem Conservation Area which is a kind of marine protected areas, the area have not been established yet, because the local fisher men and residents have been in opposition to do that.

2. Capacity Building

No special programs for capacity building for coral reefs have been established as of yet. However, we have an existing program and two proposed programs to educate scientific teachers and student who are interested in protecting environment. The programs are:

- Re-educated program for scientific teachers of middle and high school have been held once every year since 1993,
- Education program for investigators of the national survey of nature environment of Korea will be held in April 1997,
- And a joint symposium between Australia and Korea to establish marine education programs to protect temperate marine environment will be held in April 1997.

3. Research and Monitoring

The issue of protecting the ecosystems and biodiversity of the islets was first considered in the early 1980s. Surveys were carried out at the islets of Chejudo. They included:

- Ecological surveys by Cheju University (1983-1993),
- An ecological survey carried out by Korea Ocean Research & Development Institute (KORDI) (1987-1988)
- A study on marine fauna and flora by the Ministry of Culture (1992),
- Ecosystem survey conducted by the Ministry of Environment (1993),
- And surveys for biodiversity of soft coral by Ewha Women's University since 1996.

To effectively preserve the natural environment of Korea, the Ministry of Environment has conducted a comprehensive survey every ten years to obtain needed data on the natural environment across the country including coastal areas and sea areas. Based on the first basic survey of natural environment (1986-1990), the second survey will be started in 1997 for the coastal areas and in 1998 for the sea areas. The surveys will cover a wide range of factors, including the current utilization of coastal areas and may change in the use as well as the presence and distribution of fauna and flora in developed area.

Reference

Jun-Im Song, 1996. Conservation of Marine Invertebrate resources in the Cheju Island area of the Korean Waters. *Galaxea*, 13: 93-107.

Country : Malaysia

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1. Coastal Management

1.1 Prohibition of Fisheries Which Destroy Coral Reefs

Fishing using explosive and chemical is prohibited under the Section 26 of Fisheries Act 1985. These fishing methods are not practiced in Peninsular Malaysia, but evidence suggests that it is practiced in the state of Sabah. However, the extend of the fishing practices is small and only confined to area predominates by migrants from the neighboring countries. The impact of this illegal fishing practices has caused widespread destruction due to the cumulative impacts and the slow recovery of the impacted areas.

Programs have been formulated to address the issue of fishing using explosive and chemical (cyanide) in the states of Sabah and Sarawak. Among the programs that have been planned are:

- I. A task force comprising of agencies at federal, state and local levels was created to plan and formulates programs to address this issue, The inter agencies networking will consolidate the work force and financial resources at addressing the issue.
- II. Gathering information to assess the extend of the fishing practices. Methods used to gather information are; consultation with local communities, mailed questionnaires and intelligence information from various enforcement agencies such as Marine Police, Sabah Parks and Department of Fisheries Sabah. The State Development Office of Sabah has plan to gather socio-economic information of the fishers involved in fishing using explosive and chemical. This information is useful for planning processes in creating alternative employment to the fishers.
- III. State wide education programs focusing on the impacts of destructive fishing methods will be carries out in the State of Sabah throughout this year. Specific publication and audio visual educational materials will be used to address this issue. There are plans to conduct public campaign through the radio services and holding exhibition at local levels to create awareness on the environmental destruction and economic loss due to these destructive fishing methods. It is to be hoped that through such awareness program a community based enforcement can be realized if not at least regular feedback's regarding such activities can be obtained for a more structured enforcement need. Future actions to address the issues of destructive fishing method are:
- IV. Create opportunity for various alternative sources of income for the coastal community. Mariculture sector has been considered as an alternative to curb the destructive practices.
- V. Increase the ability to detect cyanide in fish by establishing a facility in the state of Sabah. At present, testing of cyanide is conducted by the Chemistry Department. An increase in the ability to detect cyanide will facilitates the enforcement on the destructive fishing method.

1.2 Establishment of Marine parks

The establishment of Marine Parks in Malaysia was first initiated through the gazzettelement of Fisheries Protected Areas in 1983. Such areas were meant to be a zone whereby fishing activities would be regulated until it was gazzeted as a marine park when all fishing activities or any extractive activities is totally disallowed. At present there are 38 maritime waters within 2 nautical miles form any part off the coast of 38 islands were gazzeted as Marine Park of Malaysia. The area of Marine Park in Malaysia is 2,318.4 sq. Km. The area is divided into six regional management areas.

1.3 Establishment of Management Plan

The conceptual plan for all the marine parks was established in 1994, however there is a need for detail

zoning and management plan for each area. To date only one group of marine park has a zoning and management plan. The zoning and management plan for the other three groups of marine park are still in the draft stage, and the other two groups of island have yet to be formulated. There is an urgent need to revised the existing plans, and to formulate zoning and management plan for the one without any plan to ensure the resources in the marine park are properly managed.

1.4 Establishment and Operation of Marine Park Centers

In an effort to provide continuous protection of resources in the marine park, the Department of Fisheries beginning 1989 has established Marine Park Centers.

At present, there are four Marine Park Centers (MPC) located at 4 states in Peninsular Malaysia. Three of these Marine Park Centers are located on the island, while one center is located at the on the mainland. There are plan to establish two bases on the island and two bases on the mainland from 1997 to 2000.

The Marine Park Center acts as administrative management, enforcement and educational center. All Marine Park Centers are equipped with patrol boats to facilitate and enforcement of the Fisheries Act 1985. Two Marine Park Centers are also equip with laboratory facility. Researchers from Department of Fisheries and local universities use this facility. There are plans to allow foreign researchers to use the research facility at the park centers. The center housed a permanent exhibition center for the dissemination of information for the public.

Staff stationed at the Marine Park Center conduct environmental education program at school level on regular basis. Meeting with the stakeholder for their feedback's on management issue is held regularly at the marine park centers. With such feedback's the Marine Park Centre and managers can always strategies the next course of action in order to keep the fragile ecosystem going for the enjoyment of future generation.

1.5 Integrated Coastal Zone Management

Plan has been formulated to established the National Integrated Coastal Zone Management in Malaysia. The formulation of such plan has been given top priority under the Seventh Malaysia Plan. The Economic Planning Unit at the Prime Minister Department was given the mandate to coordinate the formulation and establishment of the plan. There are plans to conduct coastal zone studies in the State of Penang, Sabah and Sarawak as part of the effort toward realization of the national plan.

2. Capacity Building

2.1 Training

Training on coastal zone management, marine park management, coral reef monitoring techniques and coral reef taxonomy are conducted regularly to increase the Fisheries Department's capacity at managing and monitoring the resources in the marine parks. To enhance staff effectiveness training in communication skills, and enforcement is also provided.

Regular forums with public and stakeholders are held to enhance their involvement in the management processes. Participation of stakeholders in voluntary programs conducted regularly at various marine parks has fostered better relationship between users and mangers.

2.2 Development of Educational Material

The Department of Fisheries in collaboration with WWF Malaysia and Ministry of Education has developed an educational kit on the marine environment in an effort to increase awareness among school children. Plans are being made by the Ministry of Education to increase the content of the marine environment educational materials in the school curriculum.

2.3 Interagency Pollution Control

With an average of 2,000 vessels using the Strait of Malacca daily, the potential for pollution hazard is high along the 765 km long water body that separates Peninsular Malaysia and Indonesia is fairly high. There are frequent newspaper reports of ships being charged by the Department of Environment with disposing sludge into the Straits of Malacca. There is a need for better enforcement of environmental regulations under the MARPOL Conventions to minimize and prevent discharges of oil and other wastes into the straits and coastal areas.

Being a maritime nation, Malaysia is obliged to take measures to ensure that its waters is not polluted to protect the fragile coastal ecosystems. In order to achieve this, a Centre has been set up to coordinate all maritime enforcement activities. This Centre is known as the Maritime Enforcement Coordinating Centre (MECC) set up under the Prime Minister Department. The MECC also functions as a Centre to control and coordinate oil spill operations within the boundary of Malaysian Territorial Waters and the Exclusive Economic Zone of Malaysia.

Apart from MECC, there is the Environment Monitoring Control Center(EMCC) at Department of Environment, which monitor marine and land base sources of pollution. The EMCC also has responsibility and function to combat oil spill.

2.4 National Island Committee

Prior to 1997, the state government has the jurisdiction on land matters of the island. This jurisdiction includes planning and providing amenities (water and electricity supply) and providing facilities for sewage and garbage disposal.

The state government through the local councils has been involved in carrying the responsibility, but the level of involvement of local council on these matters differs from states to state. The Federal Government has directed the Department of Town and Country Planning to take over the roles of local council in planning and facilities for sewage and garbage disposal, but the jurisdiction over the land use and zoning still resides with the state government.

The Department of Town and Country Planning has formulated plans according to the level of conservation and use of the islands. The plans incorporated the guidelines for the development of the islands according to four categories; tourist island, marine park island, and nature reserve island. Plans for these islands were formulated with the feedback from the technical committee that was established to advised the Department of Town and Country Planning. The technical committee composed of representatives from the federal and state government agencies, local councils and local universities.

With the formulation of guidelines and the establishment of development plans, the terrestrial ecosystem of the islands will have better level of protection and will be integrated with the management plan of the Marine parks. It is envisage that the land base sources of pollution will be significantly reduced once the plan comes into practiced in 1997.

2.5 International Year of the Reef(IYOR)

Inconjunction with the celebration of the international year of the reef, the department of Fisheries has set up committees on; research, education, and public awareness at national level. These committees composed of representatives from various federal agencies, universities and NGOs. At the state level, the state fisheries office and the marine park center will plays their roles in creating awareness through regular briefing, discussion, exhibition and visitation program.

The research committee will be highlighting the state of the coral reef. A coral reef resource map will be produced and circulated at major exhibition events, both at national and state levels. A seminar on coral reef and its related ecosystems will be held. The research and monitoring database will aid in identifying gaps in research effort in the marine park. The education committee will launch the marine Education Kit, and conferences through out the country will be held to educate the educators on how to use the kit.

3. Research and Monitoring

3.1 Research and Monitoring Database

A lot of research and monitoring studies has been done in the Fisheries Waters of Malaysia by researchers from universities, government agencies, Non Governmental Organizations (NGOs), and international institutions. There has been a lot of human and financial resources devoted or expended to these studies. Eventhough these studies had generated a lot of information, it is however still fragmented and not consolidated. The availability and access of this information to decision makers, managers, scientists, and other users are therefore very limited. It is important to make this information readily available and easily accessible (through computer network) to all the state and federal agencies involved in managing the resources on the island and the sea.

The Department of Fisheries has already established a database on fishing boat, fishers, and gear types

that is useful for planning, zoning, and management of marine parks. This information is made available on-line with all the district offices.

The research and monitoring database is aimed at making research information readily available in the form that is useful to the managers and decision makers. The database will form the basis for storing information on research permits that has been issued to researchers. It will be useful to know who is doing what research and where it has been done. It will also provide a good mailing list of all the researchers that have been conducted in the marine park, thus providing a network to the researchers. This mailing list will also facilitate commissioning of research and monitoring projects to the researchers when the need arises.

3.2 Project Proponent Funds Monitoring Program

At present monitoring program is only compulsory for big scale development projects. The power to formulate, supervise and enforce the requirements to do monitoring studies resides with the Department of Environment. Since there are a lot of small development projects that were approved without the requirements to conduct monitoring programs, the cumulative impact of these small scale developments.

Presently, monitoring programs implementation is at the expense of the government and the public. Stakeholder who benefited from the resource utilization does not have to contribute for such funding.

The power to grant approval on Environment Impact Assessment (EIA) and to monitor its implementation resides with the Department of Environment. Monitoring programs, as part of the EIA regulatory requirement is supervised by Department of Environment. At present, monitoring studies in the marine environment is conducted by the project proponent. The onus of selecting the researcher to conduct the monitoring program is left to the project proponent. In most cases, information from these monitoring programs can not be use to improve the knowledge or understanding of the marine systems, thus rendering it useless for management purposes.

Project proponent should provide funds for monitoring studies to detect changes to the natural environment due to the implementation of such project. The tendering and appointment of consultant to conduct the research has to be done by the managing agencies, which in this case, the Department of Fisheries. This is done to ensure that the consultant is answerable to the managing authority and not to the project proponent.

Table Programs Planned For 1997 International Year of the Reef(IYOR)In Malaysia

Month	Program
January	Launching of IYOR Program
March	Launching of the Marine Education Kit
March	Launching of a book titled 'Marine Park Malaysia'
March	Launching of the Reef Fishing Reform Programs
March and July	Training on marine park management for Department of Fisheries Staff
April and July	Discussion and briefing to stakeholders (at 6 locations) to solicit feedback on the draft Marine Park Regulation.
April	Training on coral reef monitoring technique
May and September	Training on coastal zone Management for Department of Fisheries Staff
June	Launching of coral reefs stems to commemorate IYOR
June and July	Crown-of-thorns campaign programs
June, July, August and September	Fishers aware program through visitation to Marine Park. Four programs to be implemented.
31.7-3.8.97	Underwater photography competition
August	Exhibition at the National Agriculture Day
September	Seminar on research and monitoring in marine park and related ecosystems
September	Launching of a book "Bibliography of Research in Marine Park in Malaysia"
Regularly	Educational talks at schools conducted by staff at five Marine Park Centers.
Bimonthly	Reef etiquette program (26 series, half hour each) to be shown on commercial TV channel
Monthly	Exhibition on coral reef conservation held once through out the states
Monthly	Awareness program to reform destructive fishing methods(explosive and chemical) through Sabah Radio Services.
Monthly	Seminar on the Marine Education Kit at various locations through out the country.
Monthly	Press release on educational materials of coral reefs and related ecosystems, and marine park management
Monthly	Conduct education program for youth on marine environment

Country : **The Union of Myanmar**
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The Union of Myanmar is situated on mainland South East Asia and has a total land area of 676, 577 sq.km. It has a long coast line which stretches approximately 3000 km. It shares common maritime boundaries with Bangladesh and India in the Bay of Bengal and with India and Thailand in the Andaman Sea.

Myanmar's continental shelf (0-200 m depth) covers an area of approximately 230,000 sq. km with a relatively wider portion in the central and southern parts. The exclusive economic zone (EEA) is about 486,000 sq.km.

Myanmar's coast line can be divided into three coastal regions-the Rakhine Coastal Region (about 740 km), the Ayeyarwady and Gulf of Mottama Region (about 460 km) and the Tanintharyi Coastal Region (about 1200 km). There are large numbers of estuaries and islands along these coastal regions.

The oceanographic conditions of Myanmar marine waters are governed by the monsoon regime, and the influence of Ayeyarwady River reaches far out to the sea area.

The Marine and coastal environment of Myanmar is among the most diverse and productive of the region. The seas, islands, coral reefs, estuaries and mangrove ecosystem are closely linked with economic and other human activities.

Coral reefs are mostly found in the southern part of the coast line mostly in the islands of Myeik (Mergui) Archipelago. The reefs are of fringing or platform types. They are more developed below Lat. 15° N, starting from the Launglonbok Kyunzu (Moscov Is.) down to Zadetkyi Kyun (St. Matthew's Is.) near the Myanmar-Thailand maritime border. Aung Kyi (1985) described 61 species and 31 genera of hermatypic corals and four species in three genera of ahermatypes from various sites in the Myeik Archipelago. Earlier reports (UNDP/FAO 1982, FAO 1983) described a rich, diverse and well preserved system of reefs.

Major reef systems can be found in	
i. Launglonbok Kyun (Moscov Is).	Lat.14° N Long.98° E
ii. Tharawthedangyi-Donkyunzu (Elphinstone-Ross Is. group)	Lat.12° 20'N Long.98° E
iii. Pyinzabu-Letsutau Kyun (Bentic-Domel Is. group)	Lat.12° N Long.98° E
iv. Lampi-Pine Tree Is. group	Lat.10° 40'N Long.98° E
v. St. Andrew's group	Lat.10° 00'N Long.98° E
vi. Aladdin Islands.	Lat.10° 25'N Long.98° E

Being aware of the fact that coral reefs and related ecosystems are extremely valuable resources, Myanmar has formulated legislation and conservation-rehabilitation activities for sustainable use of her marine resources.

1. Coastal Management

The National Commission for Environmental Affairs (NCEA) is the focal point for all environmental affairs. The Ministry of Forestry and the Ministry of Livestock and Fisheries are the agencies responsible for managing and protecting the coastal marine resources.

a) Prohibition of the fisheries which destroy coral reefs

The Forest Law and Protection of Wildlife, Wild plants and Conservation of Natural Areas legislation were promulgated in 1992 and 1994 to conserve and implement sustainable management of forest resources and Wildlife. The Law relating to the Fishing Rights of Foreign Fishing Vessels (1984) and Myanmar Fisheries Law (1990) clearly prohibit the use of explosives, poisons and toxic chemicals, harmful agents and damaging gears.

b) Establishment and management of marine conservation zones

The Myanmar Government jointly with UNDP/FAO is exerting efforts to rehabilitate degraded mangroves of the Ayeyarwady Delta. A National Marine Park has been designated at Lampi Island (Lat. 10° N, Long. 97° E) as a first step in a plan to conserve and use sustainable in and ecofriendly manner the marine resources of Myanmar. Survey for additional marine protected areas are underway. Measures for the protection and sustainable management of Birdnest Islands Reserves are being instituted. These will be extended to cover the Moscos Islands Wild Life sanctuaries, an important area for avifauna, marine turtles, corals and other marine life.

c) Integrated coastal management including countermeasures against pollutants

To prevent and control marine pollution, the Pesticide Law was enacted in (1990) to regulate and control the selection, storage, transportation and the use of pesticides. The Myanmar Investment Commission (1994) notified that all permitted enterprises shall compulsorily install Sewage Treatment Plant, Industrial Waste Water Treatment Plant and other pollution control procedures and abide with existing sanitary and health regulations set by the authorities concerned.

In order to cooperate with the international community, Myanmar has signed the United Nations Convention on the Law of the Sea in (1982). In (1988), Myanmar acceded to the International Convention for the Prevention of Pollution from Ships (1973) and the Protocol of 1978 (MARPOL 1973/78).

However during the last 15 years, many reefs south of Lat. 11° N has suffered much destruction. Dynamite fishing by foreign poachers, anchor damage, trampling, over fishing and over harvesting have devastated the marine flora and fauna associated with the reefs. Sedimentation caused by erosion from illegally logged sites on the islands also smother corals and associated animals by burying them.

Dynamite fishing is the main cause of degradation and destruction of reefs in Myanmar. Foreign poachers are the main culprits as explosives (caps, fuse, and powder) are not readily available to Myanmar fishermen, and the practice was not accepted by the community. Dynamite fishing first kills the coral, fish and associated invertebrates through the direct impact of the blast and the associated shock waves. The rubble produced by the blast is then dragged across the reef by tides and waves, grinding all that remains of the reef into sand. Their habitat destroyed, reef fish also disappeared. Without herbivorous fish and invertebrates, algae soon dominate and over-grow the few surviving corals. What remain is a sterile pile of sand and rubble that new corals and other invertebrate larvae cannot colonize (Fischer 1996).

Anchor damage caused by fishing boats seeking shelter from rough seas and by boats belonging to Salon natives (Sea Gypsies) diving for sea cucumber, (bech-de-mer) edible urchins, Tridacna clams and other shells is the second most frequently encountered damage on the reefs. Searching for shells or digging clams at low tide also causes coral destruction through trampling and fragmentation through digging. There are also unconfirmed reports of digging live corals for sale to buyers from across the border for use in marine aquarium. Although there is no known major coral industry in Myanmar, coral skeletons are commonly sold as souvenirs or ornaments at many sea side resorts. It is also believed that stony corals are of medicinal value. It is quite common to see a road side hawker praising the medicinal value of a piece of coral as if it were a panacea to all ailments.

Reef fish populations have suffered both from habitat loss due to the destruction of the reef and from over fishing. During a recent survey at Lampi Island very few predatory and herbivorous fish were observed, those encountered were undersized. Even fish that are not of high commercial value have decreased in abundance and size. Reef fish are taken intentionally and incidentally (e.g. by drift nets) and many are sold commercially. Examination of catches from several boats fishing for mackerel and other pelagic species revealed several species of good sized reef fish in their take, although they claimed they have been fishing offshore. A small scale live fish trade was reported from Myeik. The fish, mainly groupers were caught using traps. Fortunately cyanide fishing has not enter Myanmar yet.

Many reefs observed during a recent survey at Lampi Island were covered with sediment. The primary source of sediment appears to be erosion from many logged sites on the island and from the neighboring islands. Degradation of mangroves on the main land could be another source of sediment plumes observed near the island.

All this has happened in spite of the efforts by departments responsible for the management of the marine coastal zone, the much desired integrated multi-disciplinary approach is lacking. Furthermore the difficulty of access to remote areas where many of the important coastal/marine zones exists, and lack of adequate infrastructure and sufficient funding, trained personnel, are some of the major constraints in the effective management of the resources.

2. Capacity Building

Like most of the developing countries in the region, Myanmar lacks the expertise in the integrated management of coral reefs and related coastal zones. The University of Mawlamyine has established the Department of Marine Science in 1973. It is offering undergraduate and graduate courses in the fields of Oceanography, Marine Ecology, Fishery Science and Aquaculture. The department has a research station with running sea water facilities at Setse, on the Gulf of Mottama. The station is at present used mainly for training and research in Aquaculture. The Department also conducts regular research cruises with the 16 meter training and research vessel contributing data on physical oceanography, chemical oceanography, ecological, and fish population studies. It could serve as a core department in Myanmar for the training of resource managers and planners for marine affairs. However, urgent strengthening of the institution is a prerequisite.

To enhance the awareness of the public as well as support by the decision-makers a Seminar on Sustainable Management of Coral Reefs and Related Ecosystems in Myanmar was held by the Ministry of Forestry in 1996. The Seminar helped to highlight the need for an extensive survey of the present state of the coral reefs in Myanmar and also on the need for interdepartmental cooperation in formulating management programs. As a result a survey team traveled to Lampi Island a designated Marine National Park to assess the condition of the marine ecosystem within the proposed boundaries for Lampi National Park to determine what measures are necessary to safeguard the marine resources of the park, and to gather relevant data on the marine ecosystems within the park to support preparation of a five year management plan. The study was funded jointly by the Wildlife Conservation Society (WCS) of New York Zoological Society and the Forest Department.

3. Research and Monitoring

The University of Mawlamyine, in cooperation with the National Commission for Environmental Affairs, Directorate of Fisheries and The Forest Department is conducting a survey program to assess the impact of human activity on coral reefs. The program will attempt to:-

- a) map damage and degraded reefs
- b) rank damage and to relate damage to village sites and fishing activities
- c) based on the preliminary findings to develop a long term monitoring program

4. Other Related Information

Lampi Island National Park

The Lampi island national park was established with the goal of preserving an important piece of Myanmar's natural heritage. The Government of Myanmar declared Lampi Island and its surrounding Islands as a national park in 1996. A two mile fishery reserve zone was also established around the island. The total area of the park is 112.5 sq. km. There are probably a small number of locations in the world where it is possible to explore four forest ecosystems and coral reefs all within a five kilometer walk. On lampi, it is possible to explore mangrove forest, dune forest, evergreen forest and rain forest, much of it in relatively pristine primary condition, all within a half days walk.

Added to this is the opportunity to view or be involved in the surveying and recording of flora and fauna of all forest systems, and of marine flora, and fauna in a prolific marine environment including viewing of pilot whales, dolphins and marine turtles makes Lampi an attractive site for ecotourism (Kent 1996).

Surveys conducted by the forest department with UNDP and FAO in the early eighties, reported rich, diverse and well preserved coral reefs. Based on these reports, Lampi Island was recommended as Myanmar's first Marine National Park. But in the 15 years since these reports were written, most of the reefs around Lampi Island have been destroyed. The vast majority of the reefs within the proposed park boundaries are now dead

or dying. Even with complete protection the reefs around Lampi will require centuries to recover, that is if they can recover at all.

The Causes of mortality differ at various localities. Most reefs have suffered from extensive dynamite fishing. For example Lagyan Aw in the north had supported a spectacular reef of high diversity and aesthetic beauty. This reef is now mostly rubble as a result of fishing.

Sea turtles nesting sites were found on Leik-U Kyun and on Wa Kyun; however all the nests had been raided. Bottlenosed dolphin (*Tursiops truncatus*) and a larger cetacean (a pilot whale, *Grampus griseus*?) was sighted within the park's boundary, and dugongs are reported occasionally. If this proves true, Lampi may represent one of the few remaining refuges for this species in Asia.

The condition of the park's forest and terrestrial wildlife, as characterized in Rabinowitz (1995) remains largely intact, although the pace of deforestation and habitat destruction appears to have accelerating. (Fischer 1996). Lampi island retains relatively complete forest cover of tropical, wet, and evergreen forests in the interior and mangrove and beach (dune) forest at fresh water sources along the margins. However much of the evergreen forest has been subjected to illegal logging.

Our experiences at Lampi indicated that management of terrestrial habitats are much more "easier" than marine habitats. They are easy to monitor, and the administrative as well as technical man power already exist. When we tried to establish a marine park, we had to start from square one. Lack of information on the fauna and flora of the seas, lack of trained divers to conduct surveys on the reefs the areas remain in accessible except by specially chartered boats, and most of all lack of the public awareness on what is happening under water leads to the tragic destruction of what could have been the most beautiful marine park in South East Asia.

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The Philippines, being an archipelagoic nation, has been highly dependent on its marine resources (Gomez et al. 1994). The reefs are important to the population because it is a cheap source of protein (McManus 1988), is a source of livelihood for displaced urban poor and landless farmers, and is an erosion buffer against frequent tropical storms (Alino and Gomez 1994). In addition, the Philippines is located in one of the most biodiverse regions in the marine tropics and can benefit from this biodiversity through medicinal and horticultural uses (Alino et al. 1990). All these have highlighted the need for: a) better understanding of the nation's coastal resources, b) more effective action towards assuring the sustainable use of these resources (e.g. 1995 ICRI Dumaguete document) and c) coordinated efforts for the allocation of optimal benefits at local, national and global levels.

1. Coastal Management

The Philippines is one of the few models outside of the Great Barrier Reef where the establishment of Marine Reserves has been shown to enhance the areas adjacent to the sanctuary/reserve (Russ and Alcala 1994). At the same time the frustrations of a developing country situation are also exemplified here since the problems are not outside the problems of society (Chua and Pauly 1989, Pauly and Chua 1998, Alino and Menez 1995, Padilla and de Los Angeles 1992). In response to these complex Third World setting issues and needs, a variety of initiatives have sprouted. Aside from many Community Based Coastal Resource Management (CBCRM) being undertaken by Non-Governmental Organizations (NGOs) (Ferrer 1993), many government coordinated programs have grown in the last decade. Alino and Menez (1995) have outlined the different organizational and administrative manifestations of these programs, while Uychiaoco et al. (in prep.,) updates these review by comparing their conceptual frameworks and providing a checklist for the various concerns being addressed at each site.

At present some of the major programs of the government which have direct coastal management components are: i) the Department of Agriculture-Fisheries Sector Program (DA-FSP) which focuses on twelve priority bays, ii) the Department of Environment and Natural Resources (DENR) Coastal Environment Program (CEP) which focuses in at least 12 sites in the 12 geopolitical regions of the country, iii) the National Integrated Protected Areas System (NIPAS) which has at least 10 priority sites considered as representative pilot areas in 10 important biogeographic zones, though of these only four have considerable marine components, iv) the Lingayen Gulf Coastal Area Management Commission established under the Office of the President, and v) the United Nations Development Program (UNDP) - International Maritime Organization (IMO) pilot site in Batangas Bay. In addition, the Philippine Fisheries Management Resources Project (PFMRP) will continue the ADB-FSP initiatives in 12 bays with the addition of four more priority areas.

2. Capacity Building

The various government sponsored initiatives would seem to have some success in the institutionalization of some laws (e.g. the NIPAS Act and the PD 704 & 169). It may also have indirectly facilitated the growth of some academic institutions like the University of the Philippines - Marine Science Institute and the Silliman University which are the two most prominent academic institutions in marine conservation and management in the country (Gomez et al. 1994). The various programs by both the DA (e.g. the ADB-FSP) and the DENR (e.g. NIPAS and CEP) have stimulated the capacity of both the government staff and its collaborators in the private sector (e.g. the NGOs sometimes including corporate partners). Networking has also enhanced the capacity of NGOs, especially these partnerships have provided the needed technical and financial support. One national network, the Philippine Coral Reef Information Network (PhilReefs) was established under joint initiatives from both government institutions and NGOs to enhance their coordination through networking and communicating information through common databases and similar management evaluation procedures. The network hopes to establish an initial comparable system of monitoring and evaluating their initiatives in at least 30 sites all over the country.

Through the Ad Hoc Committee of the President of the Philippines to improve Marine Science in the country, it is expected that manpower development in marine conservation will be stimulated. Funds from CHED for scholarships and curricular development in tertiary education have been considerable in the recent year,

especially through the chairmanship of Dr. Angel Alcala. At least a 700 marine science related graduate students may be produced by the year 2000 under this program. The Rockefeller Brothers Fund together with government and NGO partners embarked on the National Training program on Integrated Coastal Management (NTPICM) have trained over a hundred participants.

Only the National Protected Areas System (NIPAS) has the institutional legal mandate wherein the national government can directly see revenues come in to marine protected areas management (Republic Act. No. 7586). On the other hand, a variety of innovative ways have been undertaken by local governments to channel needed funds into environmental management and protection. With the enactment of the Republic Act No. 7160, the Local Government Code has empowered the municipal governments to have primary control of their municipal territory (i.e. including financial benefits and the allocation thereof to its constituents). Though this has empowered many local communities to have funds allocated to CRM (e.g. in some areas from 5% to even sometimes 20% of their countrywide development fund), longer term sustainability will require that some degree of integration (e.g. watershed management regime with the coastal management realm and coordination of local, regional and national programs) and collaboration be undertaken from a regional planning and management perspective [e.g. as in the Bay Management Councils of the FSP and the PAMB structure of the DENR (e.g. Sarangani Bay, SOCSARGEN region, in Southern Mindanao).

As mentioned earlier, under PhilReefs, an "Adopt a reef program" is being undertaken. It not only seeks to enhance public participation and stewardship in the management of their reefs but also the partner institutions are being featured in the annual update of the network database thus providing recognition for their efforts on reef management. The Philippine Coral Reef Atlas supported by the Department of Science and Technology-Philippine Council for Aquatic and Marine Research and Development (DOST-PCAMRD) which is one of the expected outputs of the programs will be updated at about three to five year intervals.

3. Research and Monitoring

During the National Coral Reef Resources and Management Symposium-Workshop in June 1995, Alino et al. outlined the research questions pertaining to Philippine coral reef management: (1) the extent & condition of reef resources, (2) how and why (human and natural reasons) these habitats are changing, (3) what levels of resource use are sustainable and (4) the effectiveness of management interventions and alternative options available to maintain and/or aid recovery of degraded systems.

The PhilReefs Network is going to launch in 1997 an effort to compile a coral reef atlas of the Philippines to address the first question. This is to be sponsored by DOST-PCAMRD. It is hoped that herein will be reflected the various surveys conducted by the various DENR-CEP regional offices (who were trained in 1994), UP-MSI, Silliman University, ICLARM, MSU-Naawan, NAMRIA (remote sensing data), data collected under the DA-FSP REAs as well as data collected through PRAs (participatory rapid assessments) by NGOs. In 1996, an attempt was also made to catalog and categorize the various perceived reasons for reef degradation throughout the country. Overfishing, destructive fishing and siltation are the most common causes of human-induced stress on Philippine reefs (Alino et al. 1995). These data are presently being compiled by the U. P. Marine Science Institute for verification by the Philippine coral reefs research and management community through the PhilReefs Network. This effort was funded by the U.P. Center for Integrative and Development Studies and the DOST-PCAMRD. Questions on the levels of resource use that are sustainable and/or acceptable have not yet been systematically addressed nationwide but there have been several efforts in various sites by the U.P. Marine Science Institute (e.g. Bolinao), ICLARM and others. Finally various studies on coral transplantation have been done by the U.P. Marine Science Institute, Silliman University and the U.P. Visayas; while monitoring and evaluation of several marine protected areas (MPAs) being set-up in various parts of the country are going to be conducted in the coming years through the efforts of U.P. Marine Science Institute and the US-AID CRMP among other organizations.

4. Other Related Information

In 1996, workshops were held in Quezon City, Cebu City and Zamboanga City to (1) set-up a coastal and reef management information network and (2) set the database structure and fill-in information about specific sites. Overall almost 200 individuals representing some 100 organizational units have attended these workshops and data from some 60 or so municipalities have been collected. A meeting is slated for February 13, 1997 for an interim working group to draft more concrete details to formalize the network. The contact address for PhilReefs is philreefs@msi.upd.edu.ph. Last September 12, 1996, various groups were also convened by

ICLARM to propose some activities for the IYOR. Activities include a National Reef Day/Week, awards, reef clean-ups, seminars, newsletters and other information campaigns. The coordinating committee for IYOR is headed by Deputy Director Cesar Pagdilao of PCAMRD.

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Country : Singapore

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Introduction

The Republic of Singapore consists of a main island and almost 60 small offshore islands. The main island and islets cover an area approximately 647 km², and the surrounding territorial waters, an almost equal area of 630 km². It has a population of approximately 3 million people, covering a high population density of 4,600 persons per km² in 1995 (Ministry of Information and the Arts, 1996). Founded as a entrepot in 1819, the country has seen large scale economic development since the 1960s, and has been transformed from an economic backwater to one of the newly industrialized economies (NIEs), often described as one of the four "dragons" of Asia (Hilton & Manning, 1995). Singapore's marine environment is an important resource, playing a large role in its economic growth and prosperity, supporting the world's busiest harbor and the world's largest oil refining centre. In the early part of the development of Singapore, due to the immediate need for housing the population and aggressive economic growth, much of its natural coastal habitat was destroyed to make way for public housing and industries. It is estimated that only 1% of the original mangrove forests remains in mainland Singapore (Chou et al., 1980), while an estimated 60% of total reef areas have been lost through foreshore reclamation (Chou, 1995).

1. Coastal Management

In Singapore's highly urbanized society, fishing and collecting from the coral reefs and other coastal areas, either for the aquarium trade or for subsistence, has declined steadily since the 1980s with stricter action taken by the Police Coast Guard. For example, in October 1991, five men were arrested by the Coast Guard and their cargo of corals confiscated. This arrest was the first of its kind in Singapore (Anon., 1991a). However, no further reports of such arrests have been made.

Coral reefs

In 1991, three NGOs recommended to the Government that some coral reefs in the southern islands be conserved. Four reef areas were selected for conservation after a survey was conducted by over 150 volunteer sport divers, using the transect method described in Dartnall & Jones (1986). Results of this survey indicated the occurrence in these for areas of 197 species of scleractinian corals from 55 genera (Chou, 1993). However, the abundance and diversity of other reef organisms such as fish, spiny lobsters, and mollusks has declined due to habitat degradation and earlier removal by collectors. The Government, through the National Parks Board, carried out a detailed study on the feasibility of protecting and managing the four proposed areas. These were eventually included in the 22 areas identified for conservation under the Green Plan. A Working Group on Nature Conservation was formed by the Government to implement policy directions concerning these areas. The for marine areas have a total extent of 37.25 km² (5.9% of the territorial waters). Within these areas, coral reefs occupied 7 km² while the islands take up 6.5 km². These areas also contain a variety of other coastal habitats such as seagrass beds, mangroves and sand flats. Recommendations for conservation included:

- making the proposed areas protected areas and imposing restrictions.
- restrict the issue of permits (by the Land Office, Ministry of Law) for coral collection to research, conservation, and educational purposes only
- enforce legislation to prevent illegal harvesting of corals
- prevent dumping of spoils within and around identified coral areas and also prevent pollution from land reclamation activities
- cultivate appreciation for nature among young Singaporeans
- raise general public awareness of nature conservation and improve resources to provide its appreciation
- avoid indiscriminate promotion of ecotourism

The Police Coast Guard was identified as the agency to enforce the laws protecting coral reefs against commercial harvesting within the four areas. However, there has been no progress in the upgrading of these areas to a protected status, except for the 1996 declaration of one of them into a Marine Nature Area to be administered by the Nature Parks Board (Nathan, 1996a).

Mangroves

The only mangrove area that has been designated as a nature reserve is at Sungei Buloh. Other mangrove forests at the Mandai - Sungei Khatib Bongsu - Loyang network of mangroves have been designated as nature areas

under the "Green Plan". In addition, there are park areas which include mangroves, eg. Pasir Ris Park (northeastern Singapore).

While no specific laws for the protection of the mangrove forests exist, protection of the wild animals and the natural habitat are covered by the Wild Animals and Birds (WAB) Act (1974), the Parks and Trees Act (1975) and a National Parks (NP) Act (1990). These Acts are administered by the National Parks Board. However, loopholes in the structure of the laws exist (Lye, 1991), which need to be reconciled.

Seagrass

The loss of seagrass beds has had little observable impact, despite its importance to fisheries as nursery grounds (Wood et al., 1969). This is due to the near non-existence of commercial fisheries in Singapore waters. There was a reduction in subsistence fishing (Tham, 1973), but there is no evidence to link this with the degradation of seagrass beds.

No management plans for the conservation of existing seagrass stands or the restoration of denuded beds have been initiated, as the importance of seagrass ecosystems as a sustainable resource has not been fully appreciated. This potential is highlighted by a pilot study in the Singapore River that found artificial seagrass to be effective in increasing the fauna within three months of its implantation (Lee & Low, 1989). The conservation of seagrass beds has so far been incidental: one of the marine conservation areas has an extensive seagrass bed (*Enhalus* sp.) on its reef flat.

Industrial pollutants

There is an ever present risk of pollution from the heavy shipping activity and shipyards along the coastline. The Maritime and Port Authority of Singapore (MPA) monitors for hydrocarbons, utilizing technology such as satellite imagery to convict polluters (Teo, 1997). In addition, Singapore is an active participating member in the following programmes:

- The ASEAN oil spill contingency plan initiated by the ASEAN Expert Group on Environment (AEGE) in 1970, and has developed to include the participation of the International Maritime Organization (IMO) and the United Nations Environment Programme (UNEP). The ASEAN Senior Officials on the Environment (ASOEN) formed in 1990 is expected to ensure that the regional oil spill contingency plan is implemented successfully.
- The Oil Spill Preparedness and Response Plan (OSPAR), with Japan providing financial support to ASEAN for equipment to combat oil spills, also the operation of an information network to document oil spills.
- The East Asia Response Ltd. (EARL), formed by British Petroleum, Caltex, Exxon, Mobil and Shell, which stocks equipment capable of handling oil spills of between 10,000 and 30,000 tons (Chua, 1994).

International protocols and conventions to control shipping traffic have also been adopted and implemented to minimize the risk of marine pollution. These programmes include:

- The Traffic Separation Scheme (TSS), developed by the Tripartite Technical Experts Group (TTEG), which was adopted and implemented by Singapore, Malaysia and Indonesia in 1981 to reduce accidents along the heavily used Straits of Malacca and Straits of Singapore. A Vessel Traffic Information Scheme was set up in Singapore to ensure compliance with the TSS.
- The Asia-Pacific Memorandum of Understanding on Port State Control in the Asia-Pacific Region (1993), which establishes and maintains a system to ensure that all foreign ships visiting ports complied with the regulations set by the international conventions of MARPOL 73/78, the International Convention on Standards for Training, Certification and Watchkeeping for Seafarers (1978), the Convention on the International Regulations for Preventing Collisions at Sea (1972) and the ILO Convention No 147 Concerning Minimum Standards in Merchant Ships (1976) (Koh & Lim, unpublished).

The Pollution Control Department (PCD), Ministry of the Environment is central agency coordinating and implementing controls on pollution. They are responsible for environmental planning and building development control, air and water pollution control, and hazardous substances and toxic wastes management. Industries may be required to conduct environmental impact assessments, including measures to reduce and control discharges of waste water and cooling water, and the disposal of wastes. Industrial effluent and sewage must meet the standards set by the PCD, which is backed by several Acts and Regulations, for example, the Trade Effluent Regulations, 1976 and the Poisons Act (Hazardous Substances Rules, 1986). The collection and disposal of toxic

industrial waste is also controlled through licensing. Monitoring of the inland waterways and coastal waters is carried regularly by the Strategic Planning and Research Department (SRPD) at some 83 points in and around the island. Inspections and checks on industrial premises is also carried out by the Sewerage Department and the Public Utilities Board. Heavy penalties are imposed on offenders.

Reclamation and Development

Reclamation is expected to continue until the year 2000 and will make the country 25% larger than its original size in 1967 (Loo & Chou, 1995). As a result much of the southern islands will be developed and marine life affected as the coral reefs and seagrass beds become affected. High sedimentation levels from these activities have been recorded. Dredging and earth spoils dumping are also partly responsible. Other impacts from the development of the islands include alteration of water flow around the reefs, point sources of pollution from visitor facilities, anchor damage from pleasure craft and disturbances caused by snorkellers and SCUBA divers.

Certain mangrove areas (eg. Sungei Buloh) were developed for prawn and poultry farming in the past. However, such activities on the mainland have ceased, and are now confined to the island of Pulau Ubin in the northeast.

Natural impacts

Coral bleaching, attributed to the El Nino event, did not affect corals in Singapore. Storm-induced damage and *Drupella* infestations are negligible while *Acanthaster* infestations have not been recorded.

Integrated management

While protection of terrestrial habitats is well established with specialized agencies having the appropriate legislative framework, an integrated management strategy for coastal waters does not exist, despite the increasing pressure of multiple use on coastal waters. The lack of an institutional mechanism for coordinated protection of coral reefs and marine life needs to be addressed. Steps are being taken to integrate and update existing laws, including the formulation of an "umbrella" law (Anon., 1994), encompassing four separate Acts that cover the environment (the Water Pollution Act, the Clean Air Act, the Environment Public Health Act and the Poisons Act). A review of current industrial site laws is also underway (Nathan, 1996b). A single agency that has full jurisdiction of both land and sea over the proposed areas is needed. The National Parks Board is seen as the most appropriate agency for these responsibilities. Additionally, many developers are now conducting baseline studies and environmental impact assessments of proposed major projects, even though such studies are not mandatory.

2. Capacity Building

Education

Several organizations are involved in the dissemination of information on conservation issues to the public:

The Nature Society (Singapore) (NSS) is made up of conservation-minded individuals, and is educating the public through talks and books, such as the "The Singapore Red Data Book" (Ng & Wee, 1994). However, the emphasis of the Society is Terrestrial.

The Reef Survey and Conservation Project involving three non-governmental organizations (Republic of Singapore Yacht Club, Singapore Institute of Biology and Singapore Underwater Federation) trained 150 volunteer divers to conduct coral reef surveys in the southern islands of Singapore between 1987 and 1991. Based on the information gathered, four areas of coral reefs worthy of being conserved were identified (Chou, 1990; 1991a), and the report submitted to the Government for consideration.

The Singapore Environmental Council (precisely the Nation Council on the Environment), has initiated many projects aimed at increasing the awareness of school students on conservation issues, including the Reefs Insights programme, which is targeted at secondary and pre-university students.

The National University of Singapore, comprising academic staff, research assistants and post-graduate students, supply scientific and technical support to many of the projects and publications on conservation. Posters and publications from the School of Biological Sciences (formerly Department of Zoology), National University of Singapore and the Singapore Science Centre provided an educational value to the public.

Courtesy mooring buoys were deployed by the Singapore Environment Council and Raffles Marina in 1994 (sponsored by Shell Pte Ltd.) around a reef popular with boats and divers in an effort to reduce anchor

damage.

The Singapore Underwater Federation (SUF) has also been active in promoting environmental awareness. Activities organized include underwater clean-up of some popular dive sites and a snorkeling programme for school children. They are also spear-heading a re-survey of the coral reefs to ascertain their present state of coral reef health and a mooring buoy adoption scheme.

Programmes for International Year of the Reef

The institutional members of the RSCP and NSS have joined forces, through the formation of the Singapore Reef and Marine Conservation Committee (SRMCC), to coordinate their efforts, resources and become stronger in making recommendations to the government. Activities planned for the International Year of the Reef include the deployment of mooring buoys, conducting another broad scale survey of the coral reefs involving volunteer divers and other education and public awareness activities.

3. Research and monitoring

The School of Biological Sciences, National University of Singapore, has been involved in many research initiatives, both local and regional, including:

- The ASEAN-Australia Marine Science Project: Living Coastal Resources (1985 to 1995).
- The ASEAN-US Coastal Resources Management Project (1987 to 1992).
- The ASEAN-Canada Cooperative Programme on Marine Science (since 1987).
- The United Nations Environment Programme-East Asian Seas Action Plan.
- The UNDP/IMO Regional Programme on the Prevention and Management of Marine Pollution in the East Asian Seas.
- The monitoring of artificial reefs as an enhancement tool in the rehabilitation of degraded reefs, which was initiated in 1989.
- The monitoring of soft-bottom benthic communities of major rivers of Singapore in a 5-year programme. This project is a joint project involving the School of Biological Science, National University of Singapore and the Ministry of the Environment, and began in 1993.
- The Reef Survey and Conservation Project (1987 to 1990).

Publications from these and other projects include:

Coral reefs

- Community structure (Teo, 1982; Chou, 1985, Chou & Teo, 1985; Chou & Wong, 1985; Chou, 1986a; Chou & Koh, 1986; Chou & Wong, 1986; Chong, 1986; Chou & Lim, 1988; Chou, 1988a; Lim *et al.*, 1990; Chua & Chou, 1991; Goh & Chou, 1991; Chua & Chou, 1992; Goh & Chou, 1994a);
- Distribution and systematics of the crinoids (Lim, 1987) and hard coral associates (Goh *et al.*, 1989);
- Biology of the gorgonians (Goh, 1991; Goh & Chou, 1994b), truncates (Lane, 1987) and sea urchins (Lee, 1968; Hori *et al.*, 1987);
- Bioactive compounds from corals (Ding *et al.*, 1994);
- Inter-and intra-specific interaction between coral colonies (Wong & Chou, 1993)
- Productivity of coral organisms (Tun *et al.*, 1994[a]; [b]);
- The enhancement of degraded reefs through the use of artificial substrata (Chou, 1986b; Chou & Hsu, 1988; Chou, 1988b; Chou, 1991b; Chua & Chou, 1994).
- Community structure of reef fish (Lim *et al.*, 1990; Lim & Chou, 1991; Low & Chou, 1992).
- Population dynamics of the pomacentrid community (Leng, 1990);
- A pilot study on the recruitment of fish was conducted (Low & Chou, 1994a).
- Sedimentation rates (Chan, 1980; Lane, 1991; Low & Chou, 1994b).

Seagrass

- Research on the associate shrimp *Periclimenes indicus* and mollusks of *Enhalus* beds at Pulau Hantu (Itoggi, 1971; Low, 1973)
- Quantitative and qualitative assessment of seagrass distribution and associated fauna during the ASEAN-Australia LCR project (Hsu & Chou, 1989a & b).
- Loo *et al.* (1990) conducted a qualitative study on the seagrass-associated fish community.
- Preliminary *in situ* primary productivity work on *Enhalus acoroides* using an automated respirometer (Tun *et al.*, 1994a).

Mangroves

- A summary of the state of Singapore mangroves compiled by Chou *et al.* (1980) provided an inventory of 1200 taxa.
- An updated list of brachyuran crabs was reported by Tan & Ng (1994).
- Fish fauna in some mangrove areas were reported at Low & Chou (1993; 1994c) and Lim & Larson (1994).
- Murphy (1992) on the natural history of insect herbivory on mangrove trees.
- The benthic soft-bottom community of mangrove habitats has also been examined by Goh & Chou (1993) at Sungei Buloh and Chung & Goh (1990) at Pulau Tekong.
- Faunal zonation at Pandan mangroves (in the south of Singapore) was studied by Berry (1963).
- Murphy & Lee (1991) attempted to elucidate zonal patterns of mangrove trees from stem count data and measurement of tidal ranges in the Mandai mangroves (in the north of Singapore).

Future research activities

The School has enhanced its capacity for marine science monitoring since 1984 with better equipment and facilities. In addition to monitoring programmes to detect temporal change in the coral reef community, seagrass beds and mangrove forests, emphasis on *in situ* studies on the effects of pollutants on the coral reefs and *in situ* coral reef productivity studies to further our understanding of coral biology must be initiated. Research capacity will be further enhanced with the recent establishment of a Tropical Marine Science Initiative by the National University of Singapore.

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COMPREHENSIVE APPROACH TO CORAL REEF MANAGEMENT

1. Overall Management Framework

The most effective strategy for coral reef management is to prevent damage while still allowing for sustainable uses to take place with reasonable controls. Recognizing this, the CORAL REEF PROTECTION STRATEGY focuses on clearly defined issues that aim to prevent avoidable sources of damage. Specific recommendations are then built around an analysis of these issues in terms of their ecological and economic implications and other community implications. Perhaps most important, the recommendations stem from the observations are then built around an analysis of these issues in terms of their ecological and economic implications and judgments of long-time residents of coral sites as to what are workable solutions for the area. These recommendations are made both for coral reefs within protected areas (where there is some existing jurisdictional authority) and for coral reefs outside any protected area.

Since an important goal of the process is to generate local involvement, non-regulatory initiatives are favored over strictly regulatory measures. This approach is the best way to reinforce the linkage which is very important to Thailand - the linkage between productive coastal resources, multiple use, economic growth, and community well-being.

Having provided a foundation for the strategy in the analysis of issues, the next step is to establish priorities for a *community-based habitat management program*. The following are the basic elements of the strategy presented in the next several chapters:

1. Program for Tourism, Recreation and Education aimed at reducing recreational impacts and enhancing public appreciation for coral reef;
2. Program for Sustainable Fisheries aimed at maintaining the productivity of the habitats;
3. Program for Water Quality Maintenance aimed at limiting pollution impacts from developments adjacent to coral reefs;
4. Research and Monitoring Programs aimed at improving scientific understanding of coral reef management;

The strategy makes repeated references to the local revisions, cooperative arrangements, and zoning needed to better manage coral reefs in Thailand. These legal and institutional aspects have been consolidated into the final chapter of the strategy in order to clearly convey where coordination is necessary not only for coral reef management but also for the management of other coastal habitats.

Coral reef management in Thailand relies on laws and regulations that apply to all coral reefs and additional measures applicable only to marine protected areas. In recent years, central agencies, provincial governments and the private sector have undertaken non-regulatory actions aimed at improving coral reef conditions through restoration, preventive measures and education.

1.1 Laws And Regulations

Three laws are used to protect coral reefs in Thailand: the Fisheries Law of 1947, the National Park Act of 1961, and the Enhancement and Conservation of National Environment Quality Act (NEQA) of 1992.

The Fisheries Act establishes regulations governing marine fisheries in Thailand's coastal and offshore waters. The Act establishes four types of waters: Protected Areas (also referred to as Fisheries Sanctuaries), Reserved Areas, Leased Areas, and Public Areas.

All coral reefs in Thailand are either classified as Public Areas or Protected Areas. The latter are sanctuaries where fishing or any activity likely to disturb fisheries habitat are prohibited. There are four such small sanctuaries containing approximately 2000 km² of coral reefs.

Several Ministerial Regulations and Notifications have been issued pursuant to the Fisheries Act including:

- Prohibition of the possession or use of explosives, toxic substances or electricity for fishing;
- Prohibition of sale of fish caught by illegal practices;
- Prohibition of the collection or export of corals;
- Prohibition of the collection of sponges;
- Prohibition of the collection of sea turtle eggs or sea turtles except by permit; and
- Prohibition of trawling and push-net operations within 3 km from shore.

These regulations are enforced by the Department of Fisheries (DOF) which has officers at 20 shore-based locations. The Department is currently establishing a new offshore patrol bases in the Western Gulf of Thailand. There are plans for similar patrol bases in the Andaman Sea and the Eastern Gulf.

There have been problems in enforcing coral reef protection regulations. First, the language of the law and the subsequent regulations are often unclear or incomplete. Most notably, domestic sale of coral and the use of spearguns or muro-ami are not specifically prohibited by regulation. This makes it difficult to pursue violators and impose penalties. Second, the area over which these regulations apply is large when compared to the manpower and equipment available for enforcement. Third, the Department of Fisheries has had to focus its surveillance and enforcement activities on commercial offshore fisheries rather than inshore fisheries because of limited personnel and patrol boats.

There are no size, catch or season limits in effect for reef fisheries. Such limits have been recommended in the past for the spiny lobster fishery. New regulations for the protection of several reef invertebrates and ornamental fish are now under consideration by the Department of Fisheries.

There is also evidence that awareness and acceptance of fisheries regulations among small-scale fishermen is low. Fisheries extension programs in coral areas have not been used effectively to address habitat conservation issues.

A set of urgent measures was approved by the Cabinet for approval in 1992. When approved they will authorize Navy personnel to enforce fisheries regulations pursuant to the Fisheries Act. As part of the same resolution, Cabinet is expected to approve the acquisition of several vessels for patrolling offshore coral reefs. These two actions should help increase the effectiveness of DOF regulatory effects in coral reef protection.

Nine of the 15 Marine National Parks in Thailand include significant reef areas. Most of the parks containing reefs have been designated in the Andaman Sea with only three sites designated in the Gulf of Thailand. Together with the Fisheries Protected Areas, approximately 60% of Thailand's significant coral reefs are included within a protected area.

Several institutional and operational constraints have, however, limited the effectiveness of Thailand's network of protected areas in preserving coral reef habitat. These include:

- The size of the areas designated and the boundaries have been too broad or have not corresponded to resource protection priorities;
- There have been serious conflicts between park designation and traditional uses of marine resources, particularly fisheries;
- Local economic and social priorities have been overlooked in the park management and development process;
- Jurisdiction over marine resources is unclear and there have been apparent conflicts with fisheries regulations; and
- The emphasis of marine park management has been on accommodating visitor use rather than on resource protection, marine interpretation and enforcement.

Under NEQA, the Office of Environmental Policy and Planning (OEPP) has published "Coastal Water Quality Guidelines" for the west coast of Phuket, special restrictive guidelines have been set for several coral reef areas for preservation and conservation purposes. These guidelines have not, however, been adopted by any implementing agencies or been used to affect development patterns. Also under NEQA, Environment Impact Assessments are required for selected major development that have the potential to significantly affect Thailand's natural environment. While this tool could be used to identify potential impacts on the coral reef and suggest mitigation measures, it has not, as of yet, been used for this

purpose.

1.2 Non-Regulatory Measures

Public support for coral reef management increased dramatically in late 1980's. This support came in part from the extensive media coverage of both the beauty and degradation of the Kingdom's coral reefs. Commitment to coral reef conservation has also grown in response to direct action taken at both national and local levels to reverse trends in coral reef degradation. These actions have largely been voluntary---they depended on individuals, businesses and government agencies working together to solve problems. Such voluntary effects are called "non-regulatory measures."

Non-regulatory measures can include education and scientific activities as well as direct management actions such as mooring buoy installation. OEPP has led the effort to increase public awareness about the importance of coral reefs, the human activities that are leading to their degradation and actions that can be taken to conserve this valuable habitat. This campaign has reached most of Thailand's newspapers. More intensive education efforts are ongoing in Chonbiri, Chumporn, Phuket, and Satun provinces.

The OEPP, the Tourism Authority of Thailand and volunteer associations of divers and tour boat operators have cooperated to educate boat pilots and escort guides in coral reef ecology and ways to avoid damaging reefs. The results of such efforts have been impressive in terms of changed behavior and increased commitment to conservation. The National Park Division is beginning to include coral reef information in its Park intensive programs; and the Department of Fisheries, through its extension program, has offered conservation education to reef fishermen. The Royal Forestry Department has completed management plans for Tarutao and Mu Ko Phi Phi Marine National Parks, both of which include specific measures for reef conservation and management.

Cooperation among coral reef scientists in Thailand has been extensive and is essential to the National Strategy formulation process. Researchers have worked together to document reef condition in Thailand through the ASEAN-Australian baseline study.

Communities are experimenting with techniques for reef protection. A community-based habitat protection program began in Phuket in 1987 as part of the Thailand Coastal Resources Management Project. It brought together local, provincial and national government officials and the private sector to formulate and implement a strategy for reef protection. Implementation of the Phuket coral reef protection strategy has focused on projects that address on-site damage caused by tourism-related activities. Similar projects were undertaken at Ko Samui as part of the Upper South Coastal Management Project.

The results of these demonstrations have been reported in both local and national media. By 1989, local efforts to protect coral reefs were extended beyond the demonstration areas to Krabi and Chumporn provinces. The Office of Environmental Policy and Planning continues to provide technical assistance to local volunteer groups interested in installing mooring buoys on coral reefs.

There is much that can be accomplished with non-regulatory measures. While not sufficient to halt reef degradation altogether, such measures do reduce on-site damage. More importantly, they help generate the support required to achieve compliance with the laws and regulations that must be effectively applied and enforced if Thailand is to maintain its coral reef resource.

1.3 The Management Framework

In formulating the National Coral Reef Management Strategy and in selecting measures and actions to implement policies, the Government of Thailand has recognized the following principles:

◆ **Maintain a balance in the intensity and variety of coral reef uses:**

The people of Thailand are best served if coral reefs are used for a diversity of purposes, ranging from fisheries conservation, recreational diving and snorkeling, underwater photography, and the conservation of unique species and habitats, to applied research. In order to meet the needs and expectations of all users, some reefs must be maintained in good condition with low levels of use. Other reefs must be managed to accommodate increasingly higher levels of use, or must be restored.

- ◆ Consider both national economic priorities and local needs:
National economic priorities for continued growth of coastal industries and tourism must be balanced with the basic needs of coastal communities for food, alternative sources of income, and with their aspirations for the future.
- ◆ Rely on both regulatory measures and non-regulatory measures to achieve management objectives:
Much and be accomplished through the voluntary actions of communities, local organizations, and businesses working together with government to protect coral reefs. Voluntary efforts promote local stewardship of coral reefs and other habitats. Such voluntary efforts, however, must be reinforced with clear, enforceable regulation. Therefore, the actions included in this strategy are of several types, including:
 - Regulations such as general and site-specific prohibitions for uses known to cause coral reef degradation;
 - Direct habitat enhancement and restoration, such as the installation of permanent mooring buoys;
 - Extension to disseminate the use of environmentally sound practices and technology among resource users;
 - Public education, including the dissemination of information materials and the conducting of community events and workshops;
 - Administrative review procedure such as the environmental assessment review of major coastal developments;
 - Monitoring to detect changes and trends in reef condition and use and to follow progress in implementing the strategy;
 - Research to understand the ecological processes underlying reef degradation and to improve the techniques for protection and restoration; and
 - Institutional strengthening such as technical training and interagency coordination to enhance the capacity to carry out the strategy.
- ◆ Create incentives for coral reef management:
In order to be sustainable, coastal reef management programs must offer clear incentives for participation and support by local government and by those people most affected by the management measures.
- ◆ Aim for a cooperative management approach:
Achieving the goal of sustainable use of Thailand is a shared responsibility. Implementation of the national strategy will require unprecedented cooperation between national and local government, and among government, communities, the private sector, resource users, and academic institutions.
- ◆ Make management decisions based on the best available data on reef condition, uses, and carrying capacity:
Thailand is fortunate that it possesses a solid data based on the status of its coral reefs, largely the legacy of its marine research institutes. A continued investment in acquiring and interpreting reliable information will enable government to make informed management decisions.

These principles are reflected in all aspects of the national strategy and will continue to guide its implementation.

1.4 The Management Classification Of Thailand's Coral Reefs

Underlying the National Coral Reef Management Strategy is the recognition that coral reefs, like other habitats, must be managed according to the specific conditions, the ecological status, uses, and development potential that exist at a site. For this reason, the policies and measures of the strategy are organized around a coral reef classification system. This classification system is similar in concept to the watershed classification system based for approving rural landuse development in Thailand (OEPP, 1989).

- ◆ All major reef group in Thailand have been assigned to one of four management categories as follows:

- 1.4.1 Reefs managed for local needs and benefits:
This category includes coral reefs in good or fair condition located in primarily rural areas. These reefs are used by villagers for fisheries, traditional reef harvesting, and small-scale tourism. Due to limited access and infrastructure, current development potential is low, with a focus on locally-owned businesses. The predominate causes of damage are associated with illegal fishing practices, including dynamite fishing and trawling. Sedimentation and anchor damage are secondary problems. Some of the reef groups assigned to this category are already included in fisheries sanctuaries or marine national parks, and there are reported conflicts between traditional activities and protected-area regulations.
- 1.4.2 Reefs managed for national tourism and recreation:
This category includes coral reefs used intensively for tourism, or with high potential for tourism. These reefs are further divided into two sub-categories: Intensive tourism and Ecotourism.
- 1.4.2.1 Intensive tourism
Reefs are sites in poor or fair condition located close to major beach resorts, and intensively used by tourists. These reefs are the most popular year-round destinations for tour boats, snorkelers, and divers. These are widespread signs of reef damage from anchoring, grounding, and littering. The effects of increasing recreational use are compounded by sedimentation associated with poor land use practices in nearby coastal watersheds that are being developed for tourism.
- 1.4.2.2 Ecotourism
Reefs are sites in fair to good condition, with moderate but increasing use for nature-oriented tourism. These sites are becoming increasingly popular among experienced divers and nature-oriented tourists because of their remote locations and high scenic quality. Based on tourism development trends in the province, significant increases in recreational use are expected. Existing reef conditions are at risk from increasing incidences of anchor damage, boat grounding, and sedimentation from coastal development. Many of these reef groups are already included in marine national parks, but are not actively managed. There are reported conflicts between park regulations and tourism businesses.
- 1.4.3 Reefs managed for national ecological and scientific benefits:
This category includes coral reefs of outstanding ecological value, or of known scientific interest. Generally in good or very good condition, these reefs are located around remote offshore islands with no permanent settlements, or with low existing use. Despite their isolation, these sites are not without problems. There are immediate threats from dynamite fishing, ornamental fish and shell collection, and encroachment on public-owned reef islands by illegal bungalows and other infrastructure.
- 1.4.4 Reefs managed for general use:
This category includes scattered and small coral reefs that are either in fair or poor condition, or are poorly formed due to natural oceanographic conditions. The reefs have limited significance to local economic activities. The potential for tourism development is low or unconfirmed. Because of coastal development, these reefs are subject to a wide range of impacts, including sedimentation from industrial and municipal sources; eutrophication from urban wastewater discharges; and physical damage from grounding, anchoring, and storms.

Criteria for assigning major reef groups to the four management categories were developed in consultation with national coral reef experts, local officials, and the private sector. The classification criteria are as follows:

- Existing reef conditions based on 1988 data from the ASEAN-Australia Cooperative Program on Marine Science;
- Current use, dominant causes of reef damage, and local context based on OEPP/CRMP provincial surveys; and
- Potential reef use and development opportunities based on expert judgment and OEPP/CRMP provincial surveys.

Assignment of a reef group to one of the four categories has fundamental management implications regarding:

- Activities that are either prohibited, restricted, or allowed;
- The site planning process used to implement actions; and
- The types of site-specific actions implemented.

A variety of uses may take place within each reef management category, as long as they are consistent with the overall objectives. However, certain reef uses and human activities are prohibited or restricted because of their potential impacts on reef condition or use.

The National Coral Reef Management Strategy was formulated out of the recognition that a significant national effort had to be launched to reverse trends in habitat degradation. The national strategy provides the policy framework and the means to realize this vision of the future. Its commitment to local participation in management, the geographic focus given to management, and its emphasis on tangible action will help to ensure that the challenge of effective management of Thailand's coral reefs is met with purpose and equity.

1.5 Initial Steps For Implementation

Thailand's environmental agenda for the next decade is likely to be complex and full. Realistic priorities are essential, as significant demands will be placed on the human resources and funds available for natural resources management in Thailand. This raises the question for how to begin implementation of the national strategy. Four initial steps are essential.

- ◆ Follow up the implementation phase of the national coral reef management.
The OEPP must follow up the implementation phase after cabinet approval of a resolution that incorporates the key elements of the national strategy, as agreed at the National Coral Reef Workshop in July 1991. Simultaneously, the Department of Fisheries, the Royal Forestry Department, and other central agencies must seek ministerial approval for their programs.
- ◆ Begin to mobilize staff, funds, and interagency agreements for vigorous and coordinated action.
Concerned agencies, including the Department of Fisheries, the Royal Forestry Department, the Harbor Department, the Ministry of Interior, and the OEPP must assign staff and request funds for carrying out their responsibilities under the national strategy. Concerned agencies must initiate the process of revising or amending administrative procedures and rules that affect coral reefs. Interagency agreements for enforcement, research, and other operational aspects must be developed. Technical assistance, extension services, training, and education must gradually be made available to provincial governments and coastal communities.
- ◆ Undertake demonstration projects in implementation.
The OEPP working with provincial governments, the Department of Fisheries, and the Royal Forestry Department must initiate four to five pilot implementation projects ---one for each of the reef management categories. Recommended sites for the pilot demonstration projects are as follows: (a) Mu Ko Similan Marine National Park (Ecotourism); (b) Ko tao (Scientific Reserve); (c) Ko Phangan (Local Benefits); (d) Pattaya reef group (Intensive Tourism).
- ◆ Solicit and secure continued international funding and assistance.
There is growing international support for the protection and sustainable use of coral reefs, which now and high as a shared concern of tropical developing countries, international development organizations, and environmental interest groups. As the Royal Thai Government proceeds with the long-term measures described for each policy, there is an unprecedented opportunity to seek international assistance for a few discrete short-term projects contained in the national strategy. In the upcoming year, the OEPP, in close coordination with the Department of Fisheries, the Royal Forestry Department, and Thai academic institutions should develop and submit formal requests for international funding and assistance to implement the national strategy.

2. Capacity Building

Recognizes that public support is essential for any successful resource management initiative. Public awareness, education, and participation programs play a fundamental role in building such support. Much progress has been made in Thailand through media campaigns that raise public awareness of the value and fragile nature of coral reefs. Having gained public attention, there is now an opportunity to broaden public education and participation efforts to encompass more issues and practical solutions. Informed reef users are more likely to voluntarily comply with regulations. Enhanced appreciation and understanding among decision makers, the private sector, and local residents leads to active involvement and other tangible contributions to reef management.

The Government of Thailand will use three measures to implement this policy: expanded public awareness campaigns; support for voluntary action groups; and school curriculum development.

2.1 Launch national and local public information campaigns

Large segments of the general public and selected target groups are now aware of the value of Thailand's coral reefs as a result of the media coverage of recent years. Education and public participation campaigns have largely focused on the physical damage caused to reefs by recreational use. There is a need to broaden and accelerate information campaigns to reinforce the favorable context for coral reef management.

Broadened national educational campaigns will help sustain media, public, and political attention on the most urgent reef protection issues. Local information campaigns will reach target groups such as fisherman and business, using the most appropriate communication techniques and networks. These efforts will set the stage for demonstrations in reef management, and enhance voluntary compliance with regulations of the national strategy.

At the national level, the OEPP will expand its ongoing information campaign to disseminate increasingly more focused information on the impacts of coastal development on coral reefs. In addition to addressing anchor damage, education messages will include the prevention of damage from pollution and solid waste disposal. Brochures, booklets, and media coverage will be directed at specialized audiences such as resource users, tourism businesses, and the industrial sector. The Tourism Authority of Thailand, national news media, and Thai nongovernmental organizations (NGOs) will be directly involved in implementing the campaign.

Technical assistance and funds will be made available for organizing education events and producing materials at the provincial and local levels. Educators at local community colleges and regional universities, Thai NGOs, and the provincial governments will be responsible for establishing priorities and appropriate themes for these local campaigns.

2.2 Encourage volunteer, user, private sector, and general public participation in reef management

Community organization, special-interest groups, and the private sector have an inherent interest in becoming involved in some aspects of coral reef management. There is a need to encourage and guide public participation so that volunteer efforts are effective and directed towards priority issues.

The OEPP and the Royal Forestry Department will help create cooperative partnerships among government and community groups, universities, and the private sector, to enable the active participation of the Thai people in reef management initiatives. These partnerships will take the form of joint ventures, corporate donations, volunteer action, and other ways of mobilizing people and funds for conservation.

Technical assistance, documentation, and assistance in locating funds will be provided to community groups, NGOs, and other organizations wanting to take an active role in reef management. Technical assistance will include short-term training, public workshops, extension and advisory services for organizing cleanup campaigns, installing mooring buoys and signs, planning reef-watch programs, and other field operations. Information brochures, maps, and other documentation will be made available to volunteer groups.

This measure will gradually create a context and means that favor volunteer public action in support of the national strategy. Active public participation in the practical aspects of reef management is expected

to create a sense of local and national stewardship. By developing new skills and knowledge within special interest groups, this measure is also likely to reduce demands on government staff and funds.

- 2.3 Incorporate coral reef conservation into school environmental education curricula. Experience with a pilot program in Phuket has shown that there is a keen interest among educators in adding environmental topics such as coral reefs and other coastal habitats into school curricula. These topics are timely and offer excellent opportunities for multidisciplinary classroom activities.

Over time, this measure will give Thai educators practical experience in incorporating environmental education topics into formal curricula. Innovative and relevant classroom activities will help to give youth a sense of national pride in their natural heritage, and to generate interest in resource management careers.

- 2.4 Coral Reef Management (CRM) Initiatives Programme in Thailand for the International Year of Coral Reef.

CRM is implemented the following community-based activities to support the activities of the International Coral Reef Year.

- 1) Mooring buoy installation -- Twenty permanent mooring buoys were installed as a demonstration at Patong and nearby Hae Island, both popular diving and snorkeling sites. Installation followed a training workshop for local divers who had volunteered to assist OEPP, the Department of Fisheries, the National Park Division and the Harbor Department in installing buoys. The objective of the workshop was to train local groups in procedures.
- 2) Signs -- Thirteen wayside signs promoting the wise use and conservation coral reefs were installed in intensive coral reef sites. This action was successful in demonstrating how the private sector can work with government to achieve habitat management objectives.
- 3) Community events -- Several community events that drew attention to coral reefs were sponsored and hosted by Thailand Government. These included a "Crown-of-Thorns" day in November 1997 and the second "Coral Reef Day" in April 1997.
- 4) Promotion activities -- These included the production of a coral reef poster, T.V. spots, interviews with local citizens, and extensive newspaper and magazine coverage.
- 5) Coral reef curriculum -- A coral reef curriculum was produced by the Teachers' College in cooperation with local primary grade schools. It incorporates information and classroom activities on coral reefs into the standard science curriculum for grade 4 to 6. This curriculum, the first environmental education packet produced in Phuket by a local group, was tested in several urban and rural schools and has been revised to incorporate the suggestions of local teachers.
- 6) Coral reef protection diorama at National Aquarium -- CRMP provided design advice and funding for the construction of a permanent coral reef exhibit at the aquarium. The exhibit will/ be seen by several thousand foreign and Thai tourists that visit the aquarium every year.
- 7) Coral reef protection brochures -- CRM and the American Woman's Club of Thailand produced a brochure entitled "Thailand's Underwater Gardens", which describes Thailand's coral reefs and what citizens can do to protect them.
- 8) Other local training activities -- Several Training workshops were conducted in coral reef sites for tour boat operators and guides; coastal management volunteers, mainly local business owners in the tourism industry; and the local Youth Club.

3. National monitoring program for coral reef condition and use.

As Thailand's tourism sector and coastal infrastructure continue to expand in the next decade, dramatic changes are expected in coastal land use patterns and resource uses. These changes are likely to affect conditions for coral reefs, particularly water quality. Nationwide monitoring and assessment of reef condition and use can help detect emerging problems and issues in different regions of the country. There is a consequent need to put in place the cooperative agreements between agencies, and with academic institutions, for carrying out a national monitoring program.

Until now, much of the information on coral reef condition and uses has been contained in scientific reports that were not readily available or interpreted by resource managers within local and central government agencies. There is a widespread need to make this information available in a form that is useful for policy and habitat management purposes.

The purpose of the National Coral Reef Monitoring Program will be to establish a nationwide baseline of information on reef condition, economic uses, and sources of damage. The baseline data will be periodically updated through a cooperative effort involving central and provincial governments, Thai universities, and volunteer organizations.

Concerned agencies and cooperating academic institutions will agree on a standardized protocol for monitoring reef condition based on the recommendations of the ASEAN-Australia Cooperative Program in Marine Science and similar programs established worldwide. Parameters for monitoring reef condition and evidence of human-induced damage will include: environmental parameters; surveys of benthic organisms and fish; and records of damage from crown-of-thorns, pollution, breakage, disease, and bleaching.

Concerned agencies and cooperating academic institutions will formally establish a network of permanent monitoring stations in the Andaman Sea and the Gulf of Thailand. The scientific reserves designated under the Fisheries Act will serve as control sites, providing areas of minimally disturbed reef communities. Funds will be made available for the systematic collection of monitoring data on reef condition, a responsibility that will be shared among government agencies and academic institutions.

The Department of Fisheries will assume lead responsibility for compiling monitoring data on reef condition. The department will establish a centralized geographic data base for all major reef groups. It will compile, maintain, and distribute detailed maps of reef location. The information will be used to undertake periodic analyses of nationwide status and trends in coral reef habitat.

The OEPP and the National Park Division will undertake a pilot program to identify key parameters and practical guidelines for monitoring reef uses with the participation of local volunteer groups and the private sector. The National Park Division will assume responsibility for maintaining data on reef-dependent uses and benefits within marine national parks. Periodic assessments of trends will be undertaken.

The OEPP will rely increasingly on the results of site-specific monitoring to assess the effects of coastal development on coral reefs. Impact studies will be used by the OEPP as a basis for discussion with permitting agencies and proponents on the need for improved mitigation measures.

4. Strengthening the National Coral Reef Research Program.

The OEPP, working in cooperation with the Department of Fisheries, will undertake the development of multidisciplinary research program focusing on Thailand's coral reefs and other coastal habitats. The OEPP will assume lead responsibility for the social sciences component of the research program, while the Department of Fisheries will provide oversight for the physical and biological sciences.

The advisory group of scientific experts created for the ASEAN-Australia Cooperative Program in Marine Science will be convened and asked to develop the National Coral Reef Research Program. The membership of the advisory group will be modified to include Thai experts in natural resource economics.

The research program will include the following components:

- Research priorities in the applied physical, biological, and social sciences that relate to the ecology, use, and development potential of Thailand's coral reefs;
- A formal process for soliciting and approving research proposals addressing the above priorities;
- Initiatives and responsibilities for seeking funding for basic research; and
- Incentives for private sector investments and research in the pharmaceutical applications of marine products.

Known priorities for biological research include: comparative analyses of coral reef biodiversity in the Andaman Sea and the Gulf of Thailand, continued research on the response and recovery rates of hard corals to various sources of sedimentation; and comparative analyses of different techniques for crown-of thorns eradication.

Priorities for social and economic research include: comparative analyses of the economic benefits and costs associated with the establishment and operation of marine national parks; the cultural and socio-economic importance of traditional reef harvesting activities; and methodologies to assess the recreational carrying capacity of offshore reef islands for tourism development.

As part of this initiative, measures will be taken to improve the dissemination of and access to scientific results among governments, universities, and private sector laboratories.

The government of Thailand will continue to encourage Thai research institutions to collaborate with other countries and international organizations to ensure timely access to technological and scientific developments in reef research.

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1. Coastal Management:

In Vietnam, coral reefs are widely distributed around almost islands in the continental shelf, along the coast of central region and offshore areas. Their structure is diverse including fringing reef, platform reef and atoll. They are very abundant in South Central, South-west and offshore. Up to now, 66 hermatypic coral genera have been recorded. The most coral diversity belongs to South Central region and offshore which compose of 65 recorded genera (Vo Si Tuan, 1996). With high abundance and diversity, coral reefs in some areas play important roles in fishery enhancement, shoreline protection and marine tourism.

As other countries in the region, many coral reefs in Vietnam are degradating, particularly in areas near the shoreline or near population centers (e. g. Halong Bay, Khau Hoa province, ...). Reef living resources are decreasing seriously at almost areas. The main reasons are overexploitation, destructive fishing, siltation due to deforestation and trawling fishing, mining corals, non-managed tourism and nutrient richness.

Vietnamese government already declared some legislation's to protect marine resources and environment. Regulation for fishery Protection and Development was published in 1989. According to that, the destructive fishing by poison, explosive, electricity is prohibited strictly (item 8.1). Coral reefs are considered as special habitat and also protected from destruction (item 8.2). In 1993, the Assemblage of S. R. Vietnam passed the law on Environmental Protection in which the maintain of ecosystems, biodiversity was determined being responsibility of organizations and individuals (Article 12). all acts causing environmental incidents are strictly prohibited (Article 9). The use and exploitation of nature reserves and landscapes must be subject to permission by the sectoral management authority concerned and the State management agency for environmental protection... (Article 13). In Biodiversity Action Plan published in 1995, the urgent activities were proposed to implement such as fulfilling policy and legislation, establishment and management of protected areas, enhancement of conservation awareness, capacity building, scientific study, social economy and international cooperation. However, future tasks for marine ecosystems including coral reefs and marine protected areas have been paid attention less than for terrestrial biodiversity. In recent years, prevention of marine pollution due to oil exploitation, agricultural and industrial activities, transportation has been mentioned in EIA of economical bases. However, integrated coastal management against pollution has not been implemented yet in almost areas. Fortunately, pollutants have not impacted seriously to coral reefs and related ecosystems yet. Besides, management of coastal fishery, aquaculture has conflicted with bio-social economical conditions which are different from the areas. These activities cause more serious impact to marine ecosystems.

2. Capacity building:

Recently, National Environment Agency (NEA) belonging MOSTE is responsible to manage all environmental problems of the country. There are also environment departments in every province. Parallely, Department for Protection of Aquatic Living Resources belongs to Ministry of Fishery and its offices in all coastal provinces. These organizations are responsible to make decision concerning environment and resources management. The planner and decision maker in central and provincial government have not established the priority for marine area management yet. Their awareness and experiences on marine conservation are still very low. Therefore, integrated coastal management has not been implemented effectively and widely. E.g., there have not been governmental agency and national policy on MPAs up to present. MPA system has not been formed, meanwhile on land the Ministry of Forestry has declared more than 80 national parks and forest reserves. In 1997, there is no programme to support International Year of Coral Reef either.

Capacity for research on coral reefs and related ecosystems has not invested respectively yet. Only Institute of Oceanography with head quarter in Nha Trang and other office in Hai Phong has carried out these studies. In this institute, two diving teams were established with training support from WWF. But, their studying facilities is very poor and backward. Governmental investments for enhancement of capacity building of reef surveys are very limited.

International supports have just occurred in recent years. Some workshops and training courses on coastal management and/ or MPA establishment and management were organized in Vietnam with the sponsorship of CIDA (Canada), IUCN, ... Besides, a few managers and researchers received financial support to attend symposiums, workshops on this area abroad.

The measures for community education on coral reef management have just takes scarcely because of backward behavior to the sea and inadequacy of financial sources, expertise. Only some activities have occurred with the cooperation between WWF and Institute of Oceanography. Therefore, community awareness on marine conservation generally and coral reefs particularly is increased slowly.

3. Research and Monitoring

The first surveys on coral reefs in Vietnam were carried out by French scientists of Nha Trang Institute of Oceanography in the 20th decade. Russian researchers also contribute to study coral reefs of Vietnam (mainly on taxonomy) in the 80th decade. Up to now, it has been possible to search basic information on coral reef structure, coral diversity in some papers (Latypov, 1987; Nguyen Huy Yet, 1992; Vo Si Tuan, 1996; Vo Si Tuan and Hodgson, 1996, ...)

Meanwhile, coral reef researches for management have not answered the requirement. The impacts to coral reefs and their degradation have just mentioned in few areas (Nguyen Huy Yet, 1992; Vo Si Tuan and Truong Si Ky, 1996...). Researches for MPA establishment have been paid attention since 1980 in the framework of the National Marine Research Programme, with the suggestion that the Con Dao islands in continental shelf and Sinh Ton atoll in Spratly islands be chosen as MPAs. From 1992-1995, with the support of WWF, the Institute of Oceanography conducted surveys and proposed priority sites for MPAs, including Cat Ba (Haiphong city), Co To (Quang Ninh province), Cu Lao Cham (Quang Nam province), Hon Mun (Nha Trang city), Cu Lao Cau (Binh Thuan province) and An Thoi (Kien Giang province). Above-mentioned surveys mainly focused on biodiversity and resource status of coral reefs and related ecosystems. There are a few information on socio-economic aspects, reasonable utilization and environment impact assessment.

The project concerning with MPA establishment based on coral reefs has been proposed in Biodiversity Action Plan. Some works have done in first phase but continuous activities have gone on sparsely. This year, local government and Institute of Oceanography try to establish a MPA in Binh Thuan province. The project on Hon Mun Marine Park (Khanh Hoa prov.) will be possible to pass.

Researches for integrated coastal management are considered as a priority task in Biodiversity Action Plan. However, only some surveys have been carried out at some lagoons, bays and islands which are very important in economical aspects. Scientific results sometime conflict with planning.

Beside continuous general research, coral reef monitoring is urgent task in Vietnam. To be part of GCRMN is a desire of the scientists and managers. The contact points compose of NEA (Mr. Hua Chien Thang) and Institute of Oceanography (Dr. Vo Si Tuan). In recent year, coral reef monitoring has been undertaken by Institute of Oceanography. The data obtained on coral cover and water quality permit to assess firstly the degradation in some small areas (Cat Ba island, Nha Trang bay). A few line transects were used to assess benthic lifeform and total fish counts. However, coral reef monitoring is considered as new concept and less priority. This activity only received small support from government in framework of general surveys on coast ecosystems. Vietnamese scientists have also received the support on materials, methods from IUCN, WWF, Australian Institute of Marine Science, Great Barrier Reef Marine Park Authority...

GCRMN Sub - Node is good idea to improve activities of the Network. Based on biogeographical characteristics, impacts and degradation of coral reefs, social - economical conditions... it is able to consider that the countries in west South China Sea (Vietnam, Cambodia, Thailand, Malaysia, Singapore) should be assisted by the same Sub - Node, We would like to nominate Japan or Australia as the country hosting this Sub Node. The staffs of Marine Parks Centre of Japan or Great Barrier Reef Marine Park Authority (Australia) and their facilities would be able to support implementing monitoring training.

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ANNEX XIV

Questionnaires on the Global Coral Reef Monitoring Network (GCRMN)

The International Coral Reef Initiative the Second Regional Workshop for the East Asian Seas

1. Does your country wish to be part of the GCRMN, and who is the contact point?

2. What coral reef monitoring is being undertaken in your country and by whom?

3. What aid agencies, institutes or countries are supporting and funding monitoring in your region?

4. Where do you consider that the GCRMN Sub-Node should be to assist your country?

5. Do you wish to nominate your country (or another) as a Sub-Node?

6. If so, what trained staff are available and what facilities would you be able to provide to the GCRMN in return for funding to implement monitoring training?

Country : Brunei Darussalam

1. Yes, Brunei Darussalam wishes to be part of GCRMN. The contact point is;

Mr. Sabri Haji Mohd. Taha
Fisheries Station
Department of Fisheries
Ministry of Industry and Primary Resources
Muara 4069
Brunei Darussalam

2. Basic coral reef monitoring is undertaken by the Department of Fisheries as part of its annual program.

3. Currently, there are no aid agencies, institutions or countries funding monitoring programs. However, funding has been given under the concluded ASEAN-US Coastal Resources Management Program and through a joint project with Brunei Shell Petroleum Sdn. Bhd.

4. The GCRMN Sub-Node should give assistance in terms of training in monitoring and enforcement.

5. No.

Country : Indonesia

1. Does your country wish to be part of the GCRMN, and who is the contact point?

Yes, it does

2. What coral reef monitoring is being undertaken in your country and by whom?

Permanent transect for long-term monitoring using life form method and by Research Development Center for Oceanology

3. What aid agencies, institutes or countries are supporting and funding monitoring in your region?

Government of Indonesia

4. Where do you consider that the GCRMN Sub-Node should be to assist your country?

Australia

5. Do you wish to nominate your country (or another) as a Sub-Node?

No.

6. If so, what trained staff are available and what facilities would you be able to provide to the GCRMN in return for funding to implement monitoring training?

Country : Japan

1. Does your country wish to be part of the GCRMN, and who is the contact point?

Japan has already noticed to be part of the GCRMN. The contact point is the Planning Division, Nature Conservation Bureau, Environment Agency.

phone: +81-3-3580-1709

fax: +81-3-3591-3228

e-mail: coral@eanet.go.jp

2. What coral reef monitoring is being undertaken in your country and by whom?

Several agencies, institutions, and prefectural governments are conducting monitoring activities.

3. What aid agencies, institutes or countries are supporting and funding monitoring in your region?

The Environment Agency in collaboration with the Marine Park Center of Japan could support monitoring in this region.

4. Where do you consider that the GCRMN Sub-Node should be to assist your country?

5. Do you wish to nominate your country (or another) as a Sub-Node?

Japan already announced to nominate as a Sub-Node at the GCRMN Steering Committee held in Panama while the 8th International Coral Reef Symposium.

6. If so, what trained staff are available and what facilities would you be able to provide to the GCRMN in return for funding to implement monitoring training?

The Marine Park Center of Japan would be able to provide skilled staffs and coordinate monitoring training.

The Environment Agency is considering to establish an International Coral Reef Research and Monitoring Center (provisional name) in Okinawa as a GCRMN Sub-Nodes for the region.

Country : Republic of Korea

1. Does your country wish to be part of GCRMN, and who is the contact point?

Yes, we wish to be part of GCRMN.

The contact point is Prof. Jun-Im Song who is director of Natural History Museum, Ewha Women's University, Seoul 120-750 Korea.

2. What coral reef monitoring is being undertaken in your country and by whom?

Refer to the country report of Korea.

3. What aid agencies, institutes or countries are supporting and funding monitoring in your region?

In Korea, the monitoring for protecting coastal ecosystems is usually supported by the Ministry of Environment (MOE) and the Ministry of Maritime Affairs and Fisheries (MOMAF).

4. Where do you consider that the GCRMN Sub-Node should be to assist your country?

Last workshop held in Bali during March, 1996

5. Do you wish to nominate your country (or another) as a Sub-Node?

Yes, we wish to nominate as a Sub-Node.

6. If so, what trained staffs are available and what facilities would be able to provide to the GCRMN in return for funding to implement monitoring training?

At present it is difficult to find proper staffs and facilities, because there is only few scientist concerned coral reef study. However there are some marine research institutions and marine scientists well trained. We will do best to find trained staffs and facilities after coming workshop will be held in Okinawa.

Country : Malaysia

1. Department of Fisheries, Malaysia wishes to participate in the GCRMN. The Department wishes to nominate the following address as the contact point;

Head, Marine Park Branch,
Department of Fisheries,
9 Floor, Wisma Tani,
Jalan Sulatan Salahuddin,
50628 Kuala Lumpur, Malaysia.
Tel: 603-2982011 Fax: 603-2910305
E-mail:abrgor01@dof.moa.my

- 2 and 3. Long term monitoring of coral reefs throughout the Peninsular Malaysia and East Malaysia is mostly undertaken by the Department of Fisheries. The Department's effort is coordinated through the Marine Park Section in collaborative with Fisheries Research Institute (an Institute under the Department of Fisheries). There are also local universities involved in the monitoring programs, but these are mostly short term with a small coverage to certain locality or specific to a project.

The funding agencies that sponsor monitoring program conducted in Malaysia are:

Agency or University Conducting The Monitoring Program	Monitoring Location	Type of Monitoring Program	Source of Funding or Aid Agency
Department of Fisheries (Marine Park Section and Fisheries Research Institute)	In marine parks area in Peninsular Malaysia, Federal Territory of Labuan, and the Terumbu Layang-Layang of Spratly Islands	Coral reef coverage, distribution of Crown-of-thorns and water quality	(Government of Malaysia through the: Marine Park Trust Fund, Department of Fisheries, and IRPA
University Sains of Malaysia	In the States of Pahang, Johor and Kedah in Pen. Malaysia	Distribution of giant clams and holothurids	University Sains of Malaysia and Marine Park Trust Fund
University Pertanian Malaysia	Pulau Redang, in the state of Terengganu, Peninsular Malaysia	Coral reef distribution and sedimentation studies	World Wide Fund For Nature Malaysia
University Malaysia Sarawak	Terumbu Layang-Layang of Spratly Islands	Coral reef coverage and water quality	University Malaysia Sarawak and IRPA
Sabah Parks	In the state of Sabah, East Malaysia	Coral reef distribution	Sabah Parks
University Malaysia Sabah	In the state of Sabah, East Malaysia	Coral reef distribution	University Malaysia Sabah and Sabah Parks

4. Preferably the GCRMN Sub-Node should be established at the Division of Resource Conservation and Management, Department of Fisheries, Kuala Lumpur. Within this division there is a Monitoring, Control and Surveillance Section that maintains the Department's database and networking among the state offices and marine park centers through out the country.
5. The Department of Fisheries, Malaysia wishes to nominate Malaysia as a Sub-Node to the GCRMN.
6. Trained staff at the Monitoring, Control and Surveillance Section, Division of Resource Conservation and Management, Department of Fisheries, Kuala Lumpur are:

Position	Number of staff
Senior System Analyst	1
System Analyst	2
Assistant System Analyst	1
Senior Technician	1
Technician	2
Total	7

Country : Myanmar

Q.1. Does your country wish to be part of GCRMN, and who is the contact point?

A. Myanmar has the intention to be part of GCRMN. The National Commission for Environmental Affairs (NCEA) is the focal point of environmental affairs in Myanmar.

Q.2. What coral reef monitoring is being undertaken in your country and by whom?

A. Survey on Impact of human activities on coral reef monitoring is being undertaken in Myanmar by Ministry of Forestry and the Department of Marine Science, University of Mawlamyine.

Q.3. What aid agencies, institutes or countries are supporting and funding monitoring in your region?

A. No funding has been provided to either the Ministry of Forestry or the Department of Marine Science, University of Mawlamyine.

Q.4. Where do you consider that the GCRMN Sub-Node should be to assist your country?

A. The GCRMN Sub-Node may best be located at the Department of Marine Science, University of Mawlamyine.

Q.5. Do you wish to nominate your country (or another) as a Sub-Node?

A. —

Q.6. If so what trained staffs are available and had facilities would be able to provide to the GCRMN in return for funding to implement monitoring training?

A. The Department of Marine Science was established 1973 and is endeavoring to expand its scope. Monitoring training would be desirable in return for information.

Country : Philippines

1. Does your Country wish to be part of the GCRMN, and who is the contact point?

Yes. The official Philippine government's contact point is the Department of Environment and Natural Resources (DENR). Marine Science Institute (MSI) of the University of the Philippines is also willing to be a node in the GCRMN.

2. What coral reef monitoring is being undertaken in your country and by whom?

The Marine Science Institute has some monitoring stations (around 10 fixed transect sites) at its Bolinao Marine Laboratory, in Lingayan Gulf. Both lifeform benthos monitoring and fish visual census are being undertaken. Recruitment studies are also being studied together with other physico-chemical parameter measurements.

Silliman University Marine Laboratory (SUML) through its foreign counterparts are doing fish census monitoring in at least four reef sites in the Visayas.

Under the Philippine Coral Reef Information Network (PhilReefs, pls. see web homepage for this), the networking partners have agreed to establish a system for the evaluation of the effectivity of reef management in their respective sites. An inter-agency coordinating group is establishing monitoring stations at the Pagasa Island of the Kalayaan Islands Group in the Spratlys region. The group of Alino (of MSI) is also the consultant and trainer to the WWF local counterpart (Kabang Kalikasan ng Pilipinas - KKP) in establishing the monitoring program for the Tubattaha National Marine Park.

3. What aid agencies, institutes or countries are supporting and funding monitoring in your region?

As mentioned earlier, UPMSI has established 10 monitoring stations around Bolinao which was funded under the United States Agency for International Development (USAID) Collaborative Research Support Program (CRSP). Monitoring of the reef fisheries, lifeform benthos and associated reef fishes have been supported by the IDRC of Canada.

The PhilReefs secretariat is funded by the Department of Science and Technology (DOST) Philippine Council for Aquatic and Marine Research and Development (PCAMRD). The DENR through its Coastal Environment Program (CEP) and Integrated Protected Areas System (IPAS) has some sites which have the potential for coral reef monitoring. The World Bank through the GEF is funding this program though only four of the IPAS sites have considerable marine component.

The Department of Agriculture (DA) through its Bureau of Fisheries and Aquatic Resources (BFAR) has initiated some survey sites (which the potential to become monitoring sites) under a Resource and Ecological Assessment (REA) of 12 priority bays under the Fisheries Sector Program (FSP). These sites have a high potential to be established for long term monitoring. Silliman University through funds from USAID has recently established a Center of Excellence in Coastal Resources Management. Some reef sites are now being monitored by their expatriate collaborators.

4. Where do you consider the GCRMN Sub-Node should be to assist your country?

I think that the U.P. Marine Science Institute together with the Silliman University can assist the CEP-DENR to be the subnode.

5. Do you wish to Nominate your country (or another) as a Sub-Node?

Yes.

6. If so, what trained staffs are available and what facilities would it be able to provide to the GCRMN in return for funding to implement monitoring and training?

MSI has at least 9 Ph.D. senior faculty who are involved in Coastal Resources Management and of these, four are directly involved in coral reef research and monitoring. It has infrastructure (one field station, office space and computer system which is networked to an Alpha DEC Workstation) to house this subnode. Aside from 10 other PhD senior staff in other related fields (e.g. oceanography, genetics, biochemistry, etc.), the institute is currently the training home base of over 70 current graduate students (50MS and 20PhD) who come from different parts of the country. Many of its staff and students are working in collaboration with ICLARM and AIMS.

Country : Singapore

1. Yes, Singapore would like to be part of the GCRMN. The contact point will be me.
2. Coral reef monitoring of 6 permanent sites has been implemented since 1987 and is continuing. Method used is that adopted by the ASEAN-Australia Living Coastal Resources Project. In addition, a simpler modification of the method was used by 150 volunteer trained divers in 1989/90 to survey 41 reefs. Following this, a recommendation was made to the Government to conserve 4 reef areas with good reef life. That recommendation has since been incorporated into the Government's Green Plan. All coral reef monitoring is carried out by the Reef Ecology Laboratory of the School of Biological Sciences, National University of Singapore.
3. The earlier (1987-1994) monitoring was carried out under the ASEAN-Australia Living Coastal Resources Project funded by AUSAID. The large scale monitoring in 1989/90 was funded by commercial sector. Continued monitoring of the 6 permanent sites since 1994 funded by National University of Singapore.
- 4, 5 & 6. We (School of Biological Sciences, National University of Singapore) will be glad to offer ourselves as a sub-node and will help train participants from countries in the region. Training will focus on survey methodology, and data management. We however, are not able to provide funds to do these training programs. We have a team of research assistants who are constantly involved in reef monitoring and are experienced in providing training. We have the infrastructure and facilities (but may need more SCUBA sets once the training begins). Accommodation at reasonable rates is available at the University.

Country : Thailand

1. Thailand will be part of GCRMN and Department of Marine Science. Faculty of Science Chulalongkorn University is the National Contact Point.
2. There are two main government agencies which have established coral reef monitoring programs (Department of Fisheries and Universities). The area of monitoring program are as follows.
 - 2.1 Ecological monitoring of structural change in coral reef communities.
 - 2.2 The effects of marine pollution on coral reef, particularly water quality monitoring program.
3. Thai Government and Cooperation Program funding by Dialogue Countries such as ASEAN-Australia Project etc.
4. In the Gulf of Thailand, particularly in intensive tourism site such as Suratthani Province, Rayong Province and in Andaman Sea such as PP Islands.
5. We are pleased to nominate Australia or Japan as a Sub-Node.

ANNEX XV

The Record of discussion of the working groups 1, 2 and 3

ANNEX XV-1

Working Group 1 in February 18

In discussing the action for ICRI related programs, the group agreed that the use of regional networking and exchange program in determining the expertise in various fields was needed. Though each country has put up their own requirement for programs under the ICRI Call to Action and Framework for Action, regionally some sort of exchange of expertise and transfer of knowledge is needed.

In line with the objective of this workshop and as a continuation to the Bali workshop, the group has suggested regional action for ICRI - related programs in the field of integrated management.

Based on what was requested among participating member countries, the following projects has been identified, though there may be overlap in certain areas.

1. Integrated management for shared boundary areas such as in the case of Indonesia/Australia, could be considered though other countries in similar situation may want to embark on this.
2. Coral Reef Status Monitoring programme among countries such as Thailand, Vietnam, Cambodia and Myanmar can also be considered where by planning and implementation can be shared among them or be transferred from other member countries.
3. Regional planning - technical and policy assistance is to be obtained through a group made up of expertise from member countries which can be called upon in an advisory capacity.
4. For the GIS/mapping and reef restoration - to have a register of expertise from member countries for experience sharing.
5. South China Sea Forum - this is already in existence and will have a workshop on South China Sea Biodiversity in Singapore in May 1997. This cooperation can enhance integrated management within member countries.
6. Trainer network which can be linked to other initiatives such as the network on Environment Training at Tertiary Level in Asia and Pacific (NETTLAP) and the UN Train-Sea-coast Programme.
7. Public education group - with members from member countries to formulate programs along with International Year of the Reef (IYOR).
8. Site management/community-based management training programme for different levels of management personnel of member countries.

ANNEX XV-2

Working Group 2 (CAPACITY BUILDING FOR ICM) in February 18

Participants were presented with a balanced view of coral reef conservation and education activities and strategies in Japan. These discussions included Japanese government agencies and NGOs, which demonstrated local and international initiatives.

Two ICRI themes were discussed: capacity building in countries to implement integrated coastal management; and capacity building for research and monitoring including initiation of the GCRMN in the East Asian Seas region. Many of the priorities discussed were outlined in the first ICRI meeting in Bali, Indonesia.

It was agreed that COBSEA through EAS/RCU should facilitate these capacity building activities.

Participants discussed the need for capacity building for the formulation of strategies for Integrated Coastal Management (ICM) and Marine Protected Area (MPA) development. Expertise in the region, particularly from Japan (such as JICA) and Australia, would be called upon to assist other countries.

The priorities discussed were acknowledged to be inter-linked and are in no particular order.

Resource Management

- Provide training to resource managers in the formulation and implementation of management plans. Participants highlighted the need for enhanced in-country capacity building which should suit local conditions.
- Provide training to resource managers in developing innovative financial mechanisms for the maintenance management programmes.
- Increase the resource manager's capacity to evaluate the effectiveness of management programmes.

Research and Monitoring

Research and monitoring is required to support the implementation of national ICM programmes. Participants acknowledged that nations have the obligation to report on the status of the environment through various international agreements. The EAS/RCU should coordinate GCRMN activities in the region as a potential mechanism to achieve this.

Enhance the capacity of countries throughout the region to carry out research and monitoring to support management programmes, in particular, Myanmar, Vietnam, and Cambodia (in the first ICRI EAS workshop) have made a strong plea for training in biophysical monitoring methods. Participants also noted that other countries in the region should also be consulted. It was noted that China, Cambodia and Taiwan were not present at the meeting, but Cambodia had already made a strong plea for training at the first ICRI meeting.

- Provide training in socioeconomic methods of assessing community interactions with coral reefs in countries such as Myanmar, Vietnam, Singapore, Malaysia, and Korea.
- Provide training and equipment in database use and application to all countries in the region, including communication and coordination of monitoring results.

ANNEX XV-3

Working Group 3 (Mechanism for Coordination, Monitoring and Evaluation) on February 20

1. Regional reports

The regional priority actions identified by Working Groups 1 & 2 were presented and discussed. The final versions are attached to the Report of the Meeting.

2. EAS UNEP GEF Strategic Action Programme

- 2.1 With respect to the call by member countries to ensure that the GEF Transboundary Diagnostic Analysis and Strategic Action Programme to be developed for the South China Sea incorporates the management needs and priorities identified in the ICRI EAS Regional Strategy, the meeting was informed that this could be facilitated by the EAS/RCU as the coordinator of the programme and through the neglective national implementing agency and national experts participating in the implementation of the programme.
- 2.2 ICRI(EAS), through this meeting strongly recommends that concerns related to coral reef conservation and integrated coastal management be adequately addressed in the EAS/UNEP/GEF Strategic Action Programme.

3. GCRMN

3.1 Coordination

Regional coordination for ICRI EAS and the GCRMN will be provided by UNEP RCU/EAS.

3.2 Framework

- 3.2.1 Many countries have expressed interest in serving as regional subnodes. This concept, however, may not be appropriate for the region in view of the large variation in present capacity (e.g. in monitoring and finance).
- 3.2.2 A more appropriate model will be where all countries will eventually be nodes that will interact with the regional coordinating node and with each other. Some countries will require assistance in capacity building to achieve functional node status.
- 3.2.3 Existing regional database mechanisms such as ENRIN, GRID in Bangkok could be used for the GCRMN EAS regional database.
- 3.2.4 COBSEA as an intergovernmental body could provide management support to the regional database. As the Secretariat to COBSEA, the EAS/RCU should initiate discussions with COBSEA members to formalize these arrangements.
- 3.2.5 Countries expressed the need for assistance in developing national capacity to deal with coordination and integration of in-country data sets, and in enhancing links between scientists and managers.

3.3 Financing

- 3.3.1 Appreciation is recorded to the Government of Japan for providing funds to the second meeting of ICRI EAS.
- 3.3.2 It was suggested that capacity building proceed incrementally at both the regional and national levels and that proposals be developed to cover :-
 - i) training (monitoring, management)
 - ii) equipment (SCUBA, computers)
 - iii) specific activities (particular to country and regional needs)

ANNEX XVI

Country Priorities

Q1. What are the key national priority programme/projects for coastal management?

1. Name	2. Status	3. ICRl Objectives	4. Description	5. Duration	6. Funding required
Biological Resource Inventory - East Asian Region of the Australian EEZ including State waters (Qld - NT border west to 29degrees South)	Proposed	1.1 1.2 1.3 1.4 3.1 3.2	(a) Broad scale mapping (approx. 1:100,000) of marine resources, with particular reference to shallow water communities, in East Asian Seas region of the Australian Exclusive Economic Zone (EEZ,) including State water. / (b) Local scale survey and mapping (approx. 1: 25,000) of selected areas including existing and proposed marine reserves, areas of high biodiversity and areas of current and potential human impact.	3 years	Approx. US\$1.5M per annum
Risk assessment, status, trends, impacts and management - East Asian Region of Australian EEZ, including state waters (Qld-NT border west to 29 degrees south)	Proposed	1.1 1.2 1.3 1.4 3.1 3.2	The objective of this project is to provide baseline information for strategic planning and management. Identification of threatening processes and determination of current status and trends through tactical surveys and the establishment of systematic long-term monitoring of key biological components of ecologically important marine resources	5 years	Approx. US\$2M per annum
This program will provide the information needed to formulate appropriate regionally integrated management strategies					

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRl EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q2. What are the key national priority programme/projects for capacity building?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
Develop integrated regional management programs with Indonesia through enhanced cooperative arrangements	Some existing programs exist Expansion required	1.1 1.2 1.3 2.3 2.4 2.5 2.6 3.4	Develop cooperative mechanisms with Indonesia to better address regional management issues particularly in relation to key ecological processes, biological connectivity's and management issues and initiatives of common interest. Sharing of expertise in monitoring and management techniques would be a key process of implementing this proposal.	5 years	US\$0.5M per annum
Develop and implement integrated marine management regimes within the Australian EAS EEZ, including state waters (Qld -NT border west to 29 degrees south).	Some existing plans and programs exist. Expansion and implementation required. Some areas of high significance have no plans or strategies	1.1 1.2 1.3 2.1 2.2 2.5	Develop integrated marine management strategies and plans for the conservation and sustainable use of coral reefs and related ecosystems in this area. Where integrated marine management strategies and plans exist, through increasing the capacity of relevant government agencies, local organizations and communities ensure their effective implementation.	5 years	US\$0.5M per annum

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q1. What are the key national priority programme/projects for coastal management?			
1.Name	2.Status	3.ICRI Objectives	4.Description
Integrated coastal zone management	on-going	1.1	Fisheries - Legislation and policies being implemented and revised/updated
			MPA - Proposal for MPAs which include policy and legislation development
		1.2	Water quality becomes a national priority with national and regional projects developed. MPA - Development of management plans
5.Duration	6.Funding required		
5 years	Internally		
5 years	Internally		
5 years	ASEAN -Australia		
5 years	internally		

Q2. What are the key national priority programme/projects for capacity building?			
1.Name	2.Status	3.ICRI Objectives	4.Description
MPA	proposed	2.1	Under the proposed MPA, extensive PA and education will be addressed. Training will be required to effectively achieve the PA.
		2.3	Training personnel in ICM, and related activities
		2.4	Regional cooperation especially with neighboring countries to minimize conflicts
		2.5	Development of effective enforcement and legal measures
5.Duration	6.Funding required		
5 years			
1 year			
long term			
1 year			

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q3. What are the key national priority programme/projects for research and monitoring?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
Coral reef Assessment	proposed	3.1	Cooperative research on MPA : - Major threats of land-based pollution need research conducted on a national level	2 years	External
		3.2	Reef survey	1 year	Internal/External
		3.3	MPA - A need to train personnel of MPA to do research and monitoring	5 years	Internal
		3.5	Regional assistance in rehabilitation of degraded ecosystems.	3 years	External

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g, "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q1. What are the key national priority programme/projects for coastal management?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
Locally based management programme	proposed	2.1 2.2 2.3	To provide the support structures, skill and resources required to empower the local community to manage their reef ecosystems: <ul style="list-style-type: none"> - community consultation and human resources development - Integrated institutions development - Strengthen community groups - Recruitment of the facilitators - Location and site management plans - Income generation and alternatives - Infrastructure development - provide technical/management expertise 	3 years	\$1,000,000

Q2. What are the key national priority programme/projects for capacity building?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
Institutional strengthening and human resources development	proposed	2.1	The development of skill and knowledge of all level <ul style="list-style-type: none"> - Training for government institutions - Training for coastal and marine managers - Formal training for project management and technical skills knowledge on coral reef management - Training program for village level facilitator - Training and development for communities to manage their own affairs and local reefs 	3 years	\$1,000,000

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q3. What are the key national priority programme/projects for research and monitoring?

1. Name	2. Status	3. ICRJ Objectives	4. Description	5. Duration	6. Funding required
Research and monitoring programme for coral reef status in Indonesia	Training the people to assess the condition of coral reef in 7 Nodes (Padang, Jakarta, Semarang, Mataram, Ujung Pandang, Manado, Ambon) Establish permanent transect for the long monitoring programme in the nodes	Long term monitoring Development of the research Data center 2.7 3.1 3.3	Developing for data based network system for coral reef information centers(CRIC's) Training the people for data handling and information system dealing to data base network Long term monitoring in the 10 nodes(7+3) Expand for 3 nodes(Medan, Kendari, Kupang)	3 years	\$2,000,000

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g, "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q3. What are the key national priority programme/projects for research and monitoring?

1. Name	2. Status	3. ICRJ Objectives	4. Description	5. Duration	6. Funding required
1 Monitoring	Processing Existing Proposal	2.7 3.2 3.3	<ul style="list-style-type: none"> Establishment of centre for coral reef research and monitoring also joining to the GCRMN. Development of monitoring method. Participation for the reef check activities. 	long term	?
2 Research		3.3 3.4	<ul style="list-style-type: none"> Research for coral reef rehabilitation. Research for clarify the economic effect from the coral area. Research for biological diversity of coral reef ecosystem 		

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRJ EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q1. What are the key national priority programme/projects for coastal management?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
The national survey for natural environment of Korea {coastal(intertidal) areas}	existing	1.1 1.2	The five-years project which is conducted by the Ministry of Environment is going to be started in early April this year. This survey covers a wide range of factors, ecosystems, flora and fauna, utilization of coastal areas, geographical features and long term monitoring using specific organisms. One of objectives of this survey is to make "a map" named Ecology Map for coastal management.	1997-2001 (5 years) 2nd stage	?
The national survey for natural environment of Korea (sea areas)	proposed	1.1 1.2 1.3 (a little bit)	The five-year project which will be conducted by the Ministry of Maritime Affairs and Fisheries will be started in 1998. This survey of the sea (subtidal areas) will cover ecosystems, flora and fauna, geological features and water quality assessment.	1998-2002 (5 years) 1st stage	May be possible to investigate the soft coral communities in Chejudo and other islands
Integrated coastal management of Korea	existing	1.1 1.2	A kind of policy project to manage the coastal areas of Korea which is fully supported by the Ministry of Maritime Affairs and Fisheries is conducted by Korea Ocean Research and Development Institute (KORDI)	1997-1999 (3 years) 2nd stage	?

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q2. What are the key national priority programme/projects for capacity building?

1. Name	2. Status	3. ICRl Objectives	4. Description	5. Duration	6. Funding required
Education program for investigator of the national survey	Proposed	2.1 2.2 2.5 2.6 2.7	Just before starting the national survey of nature environment of Korea, a training programme will be held to educate investigators who participate in the survey and long-term monitoring.	1-2 weeks/year during the survey years	?
Joint symposium between Australia and Korea to establish a marine environment education program	Proposed	2.1	The symposium which will be supported by Korea Science and Engineering Foundation (KOSEF) plans to educate scientific and environmental teachers and students who are interested in marine education to protect temperate marine environment. The symposium contains some seminars, presentations in field and field surveys at a tidal flat in the west coast of Korea and a soft coral area in Chejudo.	3 April - 10 April, 1997	?
Re-educational program for environmental teachers	Existing	2.1	On behalf of the Ministry of Education, Ewha Woman's University have re-educated general environmental studies to scientific teachers who work at middle or high school.	two months/year since 1993	?

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g., "1.1" (Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q3. What are the key national priority programme/projects for research and monitoring?

1. Name	2. Status	3. ICRI Objectives	4. Description	5. Duration	6. Funding required
The national survey for natural environment of Korea(sea areas)	Proposed	3.1 3.2 3.3 3.4	Refer to coastal management. *Korean participants will try that the research and monitoring on soft coral communities in Chejudo and its islets will be involved in the content of the survey.	1998-2002 (5 years)	May be possible for research and monitoring on soft coral areas in the coast of Korea

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q1. What are the key national priority programme/projects for coastal management?

1.Name	2.Status	3.ICRIObjectives	4.Description	5.Duration	6.Funding required
1 Formulation of Marine Park Zoning and Management Plan	Ongoing (Existing)	1.1	Need to revise four existing plans and formulate two new plans. Best provided as regional training. Where by managers and planners is provided with training on planning process to enable them to formulate management plan.	1-2 years	for managers to get training on formulation / planning processes
2 Development of Innovation Financing for Management and Research	Proposed	4.2	Need for sustaining the funding for management and research Activities derived through the Trust fund "user pays" concept. Need training for managers to formulate the guidelines for innovative financing. Best if it could be provided as regional training and after the training, consultant could work together with the trainee to formulate the guidelines.	6 month to 1 year	for a consultant formulate modus operandi /guidelines and for managers and planers to be trained through attachment with established organization
3 Monitor and evaluate the effectiveness of Marine Park	Proposed	4.3	Need to monitor and evaluate the present practices of Marine Park imangement to ensure only effective practices are used. Prefer if each country could provide a demonstrative area and each member country host a program to monitor and evaluate the management practices.	2 weeks to 1 month	for a consultant or member countries to evaluate and to train managers for the evaluation

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q2. What are the key national priority programme/projects for capacity building?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
1 Networking for education program (training) among members countries	proposed	2.1	Needs for an exchange programme among member countries for rangers and managers. Could be best provided through the regional exchange programme with a few member countries that have established and operational marine parks.	2 weeks to 1 month for each training program	for rangers and managers
2 Development of interpretative and education materials	proposed existing	2.1	To ensure effective educational/interpretative materials can be produced. Could be as an attachment training at established marine park center or institution of higher learning.	1-2 month	for interpretative/ educational Officer and managers
3 Operation of Database	proposed	2.7	Familiarization of database setup and operation will enhance the capacity to disburse information. Need training attachment with ICLARM or other centers that have an established database.	2 weeks to 1 month	for a system analyst/database manager

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g, "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q3. What are the key national priority programme/projects for research and monitoring?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
1 Social and economic evaluation techniques	Proposed	4.3	Need to familiarize with social and economic evaluation techniques. Need training on such techniques through attachment or short courses or workshops, preferably on regional basis.	1-2 months/ course or training	for managers and rangers
2 Coral Reef Restoration techniques	Proposed	3.5	Need to restore degraded area. Prefer an attachment training at an established institute and marine parks that has conducted coral reef restoration work.	1-2 months/ course or training	for scientist, manager and rangers
3 Data analysis and on techniques (Biostatistics)	Proposed	3.5	Research and activities data need to be analyzed. Need training to enhance the capacity to produce results from research and monitoring activities. Workshop or short courses for scientists at established institution of higher learning	1-2 months/ course or training	for scientist and manager

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q2. What are the key national priority programme/projects for capacity building?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
Regional Training Programme in co-operation with Thailand Cambodia and Vietnam			to be discussed with participant countries	2 years	50,000US\$

Q3. What are the key national priority programme/projects for capacity building?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
Reef Assessment Programme			<ol style="list-style-type: none"> 1 to map damaged and degraded reefs 2 rank damage and to relate damage to village sites and fishing activities. 3 based on preliminary findings to develop a long term monitoring programme. 	4 years	
Education for primary and middle school students			<ol style="list-style-type: none"> 1 to develop a package programme to offer basic knowledge of marine ecosystem to primary schools using booklets, audio-visual like video tapes and CDS. 		

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q1. What are the key national priority programme/projects for coastal management?

1. Name	2. Status	3. ICRl Objectives	4. Description	5. Duration	6. Funding required
Department of Environment and Natural Resources (DENR)					
- National Integrated Protected Areas System (NIPAS)	ONGOING	1.1 -1.4	1) Integration of upland and CZM in Representative sites of biogeographic regions	1994 - 1999	?
- Coastal Environment Program (CEP)	ONGOING	1.1 -1.4	2) Community-Based Coastal Resource Management in geopolitical regions in 61 sites e.g. Livelihood Support, Information Educational and Communication and R&D	1994 continuing	US\$2 million
- Coastal Resources Management Program (CRMP)	ONGOING	1.1 -1.4	3) Technical Assistance and Training in ICZM to Community and Nat'l Government.	1996 - 2001	

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRl EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q1. What are the key national priority programme/projects for coastal management?

1. Name	2. Status	3. ICRJ Objectives	4. Description	5. Duration	6. Funding required
- Overseas Economic Cooperation Fund (OECF)	PROPOSED	1.1 -1.4	4) Infrastructure Investment into CRM	1997 - 2004	
- UNDP International Maritime Organization (UNDP-IMO)	ONGOING	1.1 -1.4	5) ICZM for Environmental and Pollution's	1994 - 1999	
Department of Agriculture (DA) - Philippines Fisheries, Resources Management Program (PFRMP)	ONGOING (Phase II)	1.1 -1.4	1) ICRM 2) Monitoring, Control & Surveillance(MCS) 3) Livelihood Development 4) Institutional Support	1997 - 2002	+4 areas 10M/Bay US\$2 million

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRJ EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q2. What are the key national priority programme/projects for capacity building?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
Department of Science and Technology(DOST) - Philippine Council for Aquatic & Marine Research & Development (PCAMRD)	ON-GOING	2.1 -2.6		1996 - 1997	
National Training Program on Integrated Coastal Management (NTPICM)		2.1 -2.4	a) Rockefeller Bromers Fund (RBF) (ICZM training up 9 modules)		
Training of Trainers on ICZM			b) Training of national trainers and resource persons pool to be sourced from local funds.	1997	
Coral Reef Information Network (PhilReefs)		2.1,2.2,2.7	c) Database Mgt., Networking and Coordination	1996 -	US\$0.7million
ICZM for Local Government (LGA)	PROPOSED	2.1 - 2.3, 2.5	a) Training of local government officials	1997 - 1999	US\$2million
DA - Monitoring Control & Surveillance (MCS)	ONGOING	2.3,2.5,2.6	a) see earlier description (Question 1)		
- PEFRMP	ONGOING	2.1-2.3, 2.5-2.7			
DENR - CRMP	ONGOING	2.1-2.6	a) see earlier description (Question 1)		

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q3. What are the key national priority programme/projects for research and monitoring?

1. Name	2. Status	3. ICRJ Objectives	4. Description	5. Duration	6. Funding required
DOST -PCAMRD National Fisheries and Aquatic Resources R&D Plan (NAFARRA2000)	ONGOING	3.1 - 3.5	a) ICZM R and D (e.g. Resource & Ecological Assessment, Policy, Ecosystem Interaction, Recovery, Rehabilitation and enhancement)	1994 - 2000	US\$2.5 million
National Marine Science R&D Program (NMSRP)	ONGOING	3.1 - 3.5	a) ICZM R & D and Oceanography(Living & Nonliving Resources)	1994 -	US\$3.0 million
Aquatic Resources Technology Training and Information (ARTTI)	PROPOSED	3.1 - 3.3,4.1	a) ICZM and technology database management, training and resources information service		

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials),
e.g. "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q1. What are the key national priority programme/projects for coastal management?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
1. Sustainable harvesting for aquarium trade	Proposed	1.2	Pilot programme to be established for 1 or 2 reefs on the rate of sustainable harvesting and also replenishment. These will be complemented by laboratory experiments on propagation and growth.	5 years	
2. Integrated management plan for coral reefs	Proposed	1.1 1.2 1.3 1.4	To develop an integrated management plan for the 4 reef areas identified in the Green Plan	1 year	US\$40,000

Q2. What are the key national priority programme/projects for capacity building?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
3. Reef survey methodology training	Proposed	2.1 2.2 2.6 2.7	To train 300 volunteer divers on reef survey methodology. Separate training of scientists will also be conducted (possibly for the region), on reef survey and database management.	1 year	US\$50,000
4. Educational and training materials on coral reefs	Implemented	2.1	17 minute video "Coral reefs : A valuable and vulnerable resource" produced for high school level. CD-ROM on "Coral reefs" under production for undergraduate level. Training manual on "reef survey methodology" for volunteer divers. Computerized database system for spatial and temporal information of Singapore reefs.	6 months 3 months	US\$10,000 US\$50,000
5. National database on coral reefs	Proposed	2.6,2.7			

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRJ EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q3. What are the key national priority programme/projects for research and monitoring?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
1 Monitoring	Existing Proposed	2.1 3.2 3.3	Coordination and impacts on coral reef	5 years	?
2 Biodiversity Research on Coral reefs	Existing Proposed	3.3 3.4	Inventory of coral reef biodiversity - species to communities with special focus on various impacts	3 years	?
3 Rehabilitation	Proposed	3.3 3.4	Research in coral reef rehabilitation technique	5 years	?

Q3. What are the key national priority programme/projects for research and monitoring?

1.Name	2.Status	3.ICRI Objectives	4.Description	5.Duration	6.Funding required
Reef rehabilitation and monitoring	Implemented	3.1-3.5	To monitor reef response to environmental impacts particularly sedimentation and to investigate reef recovery. Data will be used to develop a "Reef Health Index"	Long Term	?
Reef productivity	Implemented	3.1-3.5	To study energy budget and nutrient fluxes on tropical sediment-stressed reefs	3 years	?
Bioactive compounds from reef organisms	Implemented	3.1-3.5	To isolate and identify bioactive compounds for pharmaceutical and environmental application	Long Term	?

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRI EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

Q1. What are the key national priority programme/projects for coastal management ?

1. Name	2. Status	3. ICRl Objectives	4. Description	5. Duration	6. Funding required
1. Protection and surveillance	Proposed Existing	1.1	Community-based action. Laws and regulations revision	5 years	?
2. Education/ awareness	Proposed Existing	2.1	Promotion through formal/informal measures <ul style="list-style-type: none"> ■ media/campaign ■ training for official/private operators ■ various educational levels ■ marine camp etc. 	3 years	?

Q2. What are the key national priority programme/projects for capacity building?

1. Name	2. Status	3. ICRl Objectives	4. Description	5. Duration	6. Funding required
1. International collaboration on coral reef status monitoring among Thailand, Cambodia and Vietnam	proposed	2.7 3.2 3.3	Thailand can assist in training and carry on the monitoring the condition of the coral reef in these countries based on ASEAN-Australia Marine Science Project experience. Proposed to have first training activity in Thailand and conduct monitoring program in each country by having personal from Thailand to assist if needed. This will be a strong capacity building in the neighboring countries	5 years	?

1. Name of the priority program/projects
2. Status of the program/projects-existing or proposed
3. List the number of the objective or objectives from the ICRl EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g. "1.1" (Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q3 What are the key national priority programme/projects for research and monitoring ?

1. Name	2. Status	3. ICRJ Objectives	4. Description	5. Duration	6. Funding required
1. Monitoring	Proposed Existing	2.7 3.2 3.3	conditions and impacts on coral reefs Inventory of coral reef biodiversity	5 years	?
2. Biodiversity Research on coral reefs	Proposed Existing	3.3 4.4	species to communities with special focus on various impacts	3 years	?
3. Rehabilitation	Proposed	3.3 3.4	Research in coral reef rehabilitation techniques community involvement in conservation activities	5 years	?

1. Name of the priority program/projects
2. Status of the program/projects-existing or proposed
3. List the number of the objective or objectives from the ICRJ EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g, "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible. identify additional funding required if possible.
6. Identify additional funding required if possible

Q1. What are the key national priority programme/projects for coastal management?

1. Name	2. Status	3. ICRl Objectives	4. Description	5. Duration	6. Funding required
Action Plan and Institutional coordination mechanism for Coral Reef Conservation and Management within ICM Context	Proposed			2 years	150,000 US\$ Internationally Funded

Q2. What are the key national priority programme/projects for capacity building?

1. Name	2. Status	3. ICRl Objectives	4. Description	5. Duration	6. Funding required
Training and education on marine conservation	Proposed		- 2 courses for managers - training "core" group (3 - 5 persons) - video on Vietnam coral reefs	2 years	60,000US\$

1. Name of the priority program/projects
2. Status of the program/projects - existing or proposed
3. List the number of the objective or objectives from the ICRl EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g, "1.1"(Policy and Legislation for ICM)
4. Brief description of program/projects and identify main requirements.
5. Duration of program/projects if possible.
6. Identify additional funding required if possible.

Q3. What are the key national priority programme/projects for research and monitoring?

1. Name	2. Status	3. ICRJ Objectives	4. Description	5. Duration	6. Funding required
Demonstration project for establishing Hon Mun MPA and Hon Mun monitoring station	Proposed Existing		<ul style="list-style-type: none"> - Study enough information for establishing and effective management - Chose permanent sites for monitoring (including outside MPAs) - Get experience for expansion of MPAs activity. 	3-5 years	500,000 US\$
Demonstration Project for establishing Cat Ba MPA and Cat Ba monitoring station	Proposed Existing			3-5 years	500,000US\$
GIS Application for Coral Reef Mapping	Proposed Existing		<ul style="list-style-type: none"> - Map of coral reef distribution(1:1,000,000) for whole country. - Map of coral reef (1:100,000) for demonstration sites 	2 years	50,000US\$

1. Name of the priority program/projects

2. Status of the program/projects - existing or proposed

3. List the number of the objective or objectives from the ICRJ EAS Regional Strategy which the program/projects addresses (refer to copy of strategy included with workshop materials), e.g, "1.1"(Policy and Legislation for ICM)

4. Brief description of program/projects and identify main requirements.

5. Duration of program/projects if possible.

6. Identify additional funding required if possible.

ANNEX XVII

Okinawa Declaration

Recalling and reaffirming the ICRI East Asian Seas Regional Strategy developed at the first East Asian Seas Regional Workshop for ICRI in Bali in 1996,

Welcoming the decision of the 19th session of the Governing Council of the United Nations Environment Programme (UNEP) that the Regional Seas Programme should continue to play an active and leading role in the development, implementation and coordination of regional activities under the ICRI,

Noting the endorsement by the 12th meeting of COBSEA of the Report of the first ICRI Regional Workshop for the East Asian Seas, including the regional strategy wherein the UNEP Regional Coordination Unit for the East Asian Seas Action Plan (EAS/RCU) was identified as the appropriate coordination mechanism for the ICRI in the East Asian Seas,

Welcoming the initiative of the Government of Japan in the establishment of the Okinawa International Coral Reef Conservation, Management and Monitoring Center and looking forward to increasing contributions by the Center to the conservation and management of the coral reefs and related ecosystems of East Asian Seas,

Reaffirming that the region is recognized as the global center of diversity for the fauna and flora of coral reefs and related ecosystems and that the conservation of these ecosystems and the biodiversity they support is of indisputable social, economic and ecological importance;

1. The participants at the Second EAS Regional Workshop for ICRI consider and welcome reports of work in progress to implement the ICRI EAS Regional Strategy. The participants note however that the extent of actions in the field and amongst the human communities most directly involved is inadequate to remove the severe threats to coral reefs and related ecosystems throughout the region;
2. The workshop identifies for each country and for the region various priority projects whose implementation is necessary in order to give effect to the ICRI priority issues;
 - Integrated Coastal Management
 - Capacity Building
 - Research and Monitoring
 - Review and Evaluation
3. The workshop calls upon governments and the international community to implement those regional and country projects identified (in paragraph 2) as part of the ICRI EAS Regional Strategy and to achieve the actions which will give effect to their commitment to the ICRI Call to Action and Framework for Action;
4. The workshop notes that the broadening of membership of COBSEA within the region would enhance fuller involvement and the capacity of countries of the region in COBSEA's role in implementation of the ICRI Call to Action, Framework for Action and the EAS Regional Strategy;
5. As matters of regional priority, the workshop,
 - a) calls upon each country to nominate demonstration area or areas which will represent best national practice in Integrated Coastal Management in coral reef areas and form the basis of a network of management expertise and practical capacity building for the EAS region and for collaboration with other ICRI regions;
 - b) identifies as a matter of urgency the need to prepare and translate training and public education materials into languages and formats appropriate for resource managers, residents and reef users at the local level;
 - c) calls upon EAS/RCU to work with the countries of the region to establish and support the operation of a technical advisory group comprising resource managers and scientists who may be called upon by countries for management and technical advice and to review the design and implementation of projects to achieve ICRI objectives;.

- d) calls upon UNEP and its EAS/RCU to collaborate with COBSEA Member States to ensure that the GEF Transboundary Diagnostic Analysis and Strategic Action Plan to be developed for the South China Sea incorporates the management needs and priorities identified in the ICRI EAS Regional Strategy and as further elaborated at this Second ICRI EAS Workshop.
 - e) requests EAS/RCU to work with countries to facilitate the establishment and conduct of collaboration projects between 2 or more member countries to address the objectives of ICRI;
 - f) urges countries to keep ICRI informed, through EAS/RCU, of specific proposals for projects which may be recommended to ICRI partners of the donor and international communities as priorities for implementation of the ICRI Call to Action, Framework for Action and EAS Regional Strategy;
 - g) recommends to COBSEA national focal points that they arrange to inform national, regional and local agencies in their respective countries of the results of the 2nd ICRI EAS workshop and;
 - nominate a national demonstration area or areas;
 - confirm national priority projects presented at the 2nd ICRI EAS workshop;
 - identify projects or programs whose initiation, strengthening or continuation is necessary in order for the demonstration areas to present best practice in Integrated Coastal Management; and,
 - identify projects or programs to build capacity for Integrated Coastal Management to be extended to address the objectives of ICRI for coral reefs and related ecosystems throughout the country;
 - h) calls upon each country to participate in the Global Coral Reef Monitoring Network (GCRMN) to assess the status and trends in their coral reefs and their use and to act on this information;
 - i) encourages all countries to facilitate national and regional partnerships between communities, resource managers and scientists to identify the critical management needs for data and information to enhance Integrated Coastal Management in coral reef areas and to take action to address these needs;
6. The workshop calls on COBSEA to include the proceeding regional priorities within the work programme of its EAS/RCU.

ANNEX XVIII

THE CALL TO ACTION

The following Call to Action was approved by the ICRI Executive Planning Committee (EPC) and the participants of the International Planning Workshop on Friday, June 2, 1995.

International Coral Reef Initiative Call To Action

The nations and organizations supporting the International Coral Reef Initiative (ICRI) urge attention to the following:

The Global Problem

Coral reefs are in serious decline globally, especially those near shallow shelves and dense populations. It has been estimated that 10 percent of the earth's coral reefs have already been seriously degraded and a much greater percentage is threatened. If allowed to continue, this decline is likely to lead to the loss of most of the world's reef resources during the next century.

The Threats to Coastal Ecosystems

- The reasons for the decline in reef health are varied, complex, and often difficult to accurately determine. While natural events such as storm damage, predator infestations, and variations in temperature - have some impact on reef ecosystems, human activity is a primary agent of degradation. Contributing factors include:

- Direct impacts from activities such as resource extraction, in-filling, over harvesting, and diving and boating activities, as well as nutrient enrichment and toxic pollution;
- Inadequate planning and management of coastal land use, including upland activities;
- Potential adverse effects of climate change, including temperature and sea-level changes, alteration of natural patterns of precipitation, tropical storms, and ocean circulation; and
- Population growth, increasing pollution and increased uses of the fragile resources will accelerate the decline in coral reef ecosystems, with societal and ecological effects extending beyond reef environments.

The significance of Coral Reef Ecosystems

Coral reef ecosystems offer benefits to humankind beyond those realized for food production, tourism, recreation, aesthetics, and shoreline protection. Capable of sustaining innumerable coastal

communities worldwide, these ecosystems also have great economic, social, and cultural importance to nations, and to entire regions. As competition among multiple uses of reef resources increases, so too will their significance to the human populations that depend on them.

Coral reef ecosystems are among the most biologically productive and diverse in the world; they also serve as indicators of environment health. These facts were recognized at the 1992 United Nations Conference on Environment and Development, where coral reefs and associated systems were accorded a high priority for protection in Agenda 21.

Reducing the Threats

Threats from human-related impacts can be minimized or eliminated through:

- Improved and sustained management practices;
- Increased national and local capacities for coral reef ecosystem management;
- Increased political support for managing coral reef ecosystems; and
- The sharing of existing important and new information related to maintaining the health of these ecosystems.

The ICRI governments endorse the following measures, to be implemented through global, regional, and national actions:

Coastal Management

- Incorporate integrated coastal management measures into local, national, and regional coastal development plans and projects and support their long-term implementation.
- These measures will serve as the framework for achieving the sustainable use of, and maintaining the health of, coral reefs and associated environments.
- Develop coral reef initiatives (regional, national and/or local). These should use an ecosystem-based, integrated approach that encourages participation and includes programs for community-based management or comanagement of reef resources.

Capacity Building

- Establish regional networks to share knowledge, skills, and information.
- Develop and support educational and informational programs aimed at reducing adverse impacts of human activities.
- Establish information exchanges with stakeholder communities.
- Improve developing nations' access to bilateral, multilateral, and other forms of financial and technical support for coral reef management.

Research and Monitoring

- Use regional networks to achieve better coordination and cooperation among national research programs.
- Promote linkages between regional and global research and monitoring networks, such as CARICOMP (Caribbean Coastal Marine Productivity), PACICOMP (Pacific Coastal Marine Productivity), and GOOS (Global Ocean Observing System).
- Support research and monitoring programs, projects, or activities identified as essential to managing coral reef ecosystems for the benefit of humankind.
- Promote the development and maintenance of a global coral reef monitoring network.

Review

- Periodically review the extent and success of implementation of actions identified in the initiative.

The nations and organizations supporting ICRI call upon all other relevant, international entities, governmental and nongovernmental organizations, including the private sector and scientific communities, to undertake the actions above.

Approved June 2, 1995

ANNEX XIX

THE FRAMEWORK FOR ACTION

Preamble

Maintaining the biological diversity, condition, resources, and values of coral reefs and related ecosystems is a matter of global urgency. While the majority of countries which have coral reefs are developing countries, there are many reefs in the waters of developed countries. This unites the developed and developing countries and should command the attention of the international community. Coral reef survival depends upon the world community acquiring and maintaining the knowledge and capacity to conserve and sustainably use coral reefs and related ecosystems. This requires that all uses and impacts be brought within and maintained at levels which do not exceed these systems' natural capacity for production and regeneration.

The International Coral Reef Initiative (ICRI) Workshop was held at Silliman University in Dumaguete City, Philippines in May 1995 to enable countries, donors, development and funding agencies to work with coral reef managers, private sector representatives, nongovernmental organizations and scientists to develop this Framework as a basis for achieving sustainable management of coral reefs and related ecosystems.

The ICRI Framework for Action builds upon and reflects the principles and processes established by Agenda 21, the U.N. Commission on Sustainable Development, the Convention on Biological Diversity, the U.N. Framework Convention on Climate Change, the Global Conference on Sustainable Development of Small Island Developing States, the U.N. Convention on the Law of the Sea, Convention on International Trade in Endangered Species of Wild Flora and Fauna, Global Program of Action to Protect the Marine Environment from Land-Based Activities and other relevant international programs. It has been developed as a succinct statement which should be read and interpreted in light of these documents. This Framework addresses the four elements of the ICRI Call to Action, which are:

- Management;
- Capacity building;
- Research and monitoring; and
- Review.

Framework Purpose

The purpose of this Framework for Action is to mobilize governments and the wide range of other stake-holders whose coordinated, vigorous and effective actions are required to implement the Call to Action.

principles

The ICRI recognizes the following principles:

- Achieving the ICRI's purpose requires the full participation and commitment of governments, local communities, donors, NGOs, the private sector, resource users and scientists; therefore true partnerships, cooperation and

DEVELOPMENT OF THE FRAMEWORK FOR ACTION

The ICRI Framework for Action was drafted by the Philippine workshop participants, reflecting a unique partnership of governments, U.N. agencies, donors, scientists, NGOs, and industry. The Framework will launch much more detailed regional and national priority setting in the next 8 months, and therefore was deliberately focused on actions at the global level.

The participants developed the Framework for Action so that it would directly address the measures identified in the Call to Action to achieve improved coastal management, capacity building, research and monitoring and review. The drafting process took account of the issues raised in the preliminary discussions and key note addresses as well as the workshops which were organized, initially, in relation to the four themes of the Call to Action and, secondly, in relation to the perspectives of the regional groups.

collaboration exemplify the ICRI activities.

- The over-riding priority is to support actions that will have tangible, positive and measurable effects on coral reefs and related ecosystems and on the well-being of the communities which depend upon them.
- Human activities are the major cause of coral reef degradation; therefore, managing coral reefs means managing those human activities. Individuals whose decisions and actions affect coral reefs—from board rooms to beaches—need to become aware of and committed to the conservation and sustainable use of coral reefs and related ecosystems.
- The diversity of cultures, traditions and governance within nations and regions should be recognized and built upon in all the ICRI activities.
- Integrated coastal management, with special emphasis on community participation and benefit, provides a framework for effective coral reef and related ecosystem management.
- Developing national capacity to conserve and sustainably use coral reefs and related ecosystems requires a long term (decadal) commitment. Improvement of coral reef management requires a permanent commitment and an adaptive approach.
- Strategic research and monitoring programs should be an integral part of the ICRI because management of coral reefs and related ecosystems should be based on the most relevant scientific information.

This approach enabled participants to address issues and priorities drawing on their experience as practitioners and paying particular regard to creating a framework which would address the range of regional requirements and would have regard to the feasibility of action in a range of regional and developmental settings.

The results of workshop discussions in the two sessions were then considered by an open-ended drafting group which included the EPC members, Chairs of the working groups and others who expressed a particular interest in being involved in the drafting of the Framework.

The ICRI workshop participants reviewed the initial draft of the Framework in plenary session. A revised draft was considered and adopted, with minor amendments taking place at a subsequent plenary session on June 2nd.

- Actions promoted under this framework should take account of, and fully use, the extensive body of international agreements and organizations that address issues related to coral reefs and related ecosystems. The ICRI will facilitate the leveraging and channeling of existing resources among all sectors for the benefit of coral reefs and related ecosystems.

Actions

- All those committed to supporting the ICRI and this Framework for Action are called upon to take account of and to act on the following at the international, regional and national levels.
- Support national and regional efforts to establish and coordinate strategies, priorities and programs to implement the ICRI Framework for Action, starting with regional workshops to be held by early 1996.
- Ensure that sustainable management of coral reefs and related ecosystems is considered at future relevant international meetings.
- Develop and/or strengthen national, regional and international mechanisms for gathering and sharing information and expertise on the sustainable management of coral reefs and related ecosystems.
- Promote improved access to financial and technological resources to enable institutions, regional centers and networks to assist and inform governments, industries and communities.

- Addressing conservation and sustainable use of coral reefs and related ecosystems requires activities in the following areas:
 - Integrated coastal management;
 - Public awareness, education and training;
 - Ratification of or accession to relevant international instruments;
 - Stakeholder participation at all levels;
 - Training policy makers and private sector decision makers in the development and implementation of coral reef management;
 - Marine science and technology;
 - Environmental law, particularly environmental impact assessment regulations; and
 - Assessing the potential for micro-enterprise development and facilitating access to financing on a small to medium scale.

Management

- Encourage governments to develop and adopt integrated coastal management measures, including:
 - Protection of the marine environment from landbased sources of marine pollution;
 - Environmentally sound land-use practices, including zoning where appropriate;
 - Measures to protect the marine environment from the adverse effect of maritime activities;
 - National and regional disaster strategies;
 - Measures to prevent illegal fishing practices, achieve sustainable fisheries and protect the ecological systems that support them;
 - Tourism management and planning;
 - Cultural aspects of resource use; and
 - Enforcement of regulations.
- Encourage governments and funding agencies to consider the ICRI Framework in project and program design and implementation.

- Encourage, where appropriate, an intersectional systems approach to planning and management.
- Encourage improved coordination among international organizations, donors and NGOs to provide more effective programs at the regional and national level.
- Encourage prompt implementation of the outcomes of FAO Code of Conduct for Responsible Fisheries and the Global Program of Action to Protect the Marine Environment from Land-Based Activities.
- Promote awareness and action by the global tourist community to minimize individual and collective impacts of tourism on coral reefs and related ecosystems.
- Promote the establishment and effective management of coastal and marine protected areas for coral reefs and related ecosystems, within the framework of customary international law as exemplified by the U.N. Convention on the Law of the Sea. This will contribute to the development of the Global Representative System of Marine Protected Areas as proposed by the World Bank, IUCN and Great Barrier Reef Marine Park Authority.
- Promote the regulation of international trade in endangered and threatened reef-associated species through the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), and improve its implementation where required.
- Encourage governments to develop and promote mechanisms for regulating international trade in species that are illegally harvested.
- Encourage governments to develop legislation, policy and institutional capacity to apply environmental assessment to development activities.
- Promote appropriate technologies, including voluntary programs and economic incentives and best management practices, for control of land-based causes of marine pollution.
- Promote and replicate successes in integrated coastal management, including community-based management, as appropriate.
- Support management measures to improve the socioeconomic condition of local communities through such means as retraining and sustainable alternative livelihood development.

Capacity Building

- Capacity building includes establishing and strengthening human resource and institutional capabilities for coastal management, science, training and education.
- Encourage regional organizations to assist countries and communities implementing ICRI, for example through measures including:
 - Preparation of project proposals; and
 - Implementation of small grant programs.
- Establish, strengthen and sustain mutually supportive networks of centers of expertise in management of coral reefs and related ecosystems.
- Base human resource development strategies on needs assessments and ensure that they address:
 - The diversity of cultures, traditions and governance structures;
 - Increased community awareness and involvement;
 - Improving the capacity of today's managers;
 - Providing for the education of tomorrow's managers;
 - Coverage of coral reef management issues in the training of all professionals whose work involves decisions which affect coral reefs and coastal resource management;
 - Technical training needs for people at the field level;
 - Training and supporting trainers to work at the community and field level;
 - Evaluation of the effectiveness of training; and
 - The need to target children in awareness raising.
- Improve coordination and targeting of the education and human resource development programs provided by development partners.
- Support formal and informal environmental education programs for all levels of the community on the subject of coral reefs and related ecosystems, with curricula and materials tailored to the interests and needs of the regions and end-users.

- Encourage maximum use of national and regional expertise in management, research and capacity building activities.
- Support the development, identification and dissemination of materials which address the interests and needs of the regions, including:
 - The value of coral reefs and related ecosystems;
 - Practical monitoring and management techniques;
 - Inventories of formal and on-the-job training opportunities;
 - Case studies of management, including success stories as well as examples which have not been successful; and
 - Case studies of human impact and natural variation in coral reefs and related ecosystems.
- Increase the relevance to ICRI of existing donor scholarship programs by:
 - Devoting a proportion of scholarship awards to environmental studies; and
 - Encouraging thesis and dissertation studies carried out in home countries.
- Encourage the private sector's role in management of coral reefs and related ecosystems through:
 - Use of appropriate technologies;
 - Development of a trained and educated workforce; and
 - Innovative approaches to better environmental operating standards.

Research & Monitoring

- Research and monitoring are needed to assess the status of coral reefs, evaluate the success of management and conservation actions and develop more effective management practices. As tropical ecosystems, coral reefs and related ecosystems are subject to dynamics which are generally less well understood than temperate systems. Therefore, without evidence it should not be assumed that they will react to natural and human disturbances in the same way as temperate systems.
- Research and monitoring programs should address biological, physical, social, cultural and economic studies and should be carried out over time periods

appropriate to their objectives. They should be supported by information management, interpretation and dissemination. In the collection of data for both research and monitoring, resource users should be involved to the maximum extent practicable.

- Promote the involvement of managers in the development, conduct, interpretation and application of research and monitoring programs.
- Promote and assist the development and application of resource assessment methods that:
 - Allow for rapid assessment to establish baselines and initiate management; and
 - Can be used in Geographic Information and Decision Support systems.
- Promote the development of a Global Coral Reef Monitoring Network under the Coastal Zone Module of the Global Ocean Observing System by incorporating and, as necessary, establishing or strengthening regional nodes.
- Encourage studies of coral reefs and related ecosystems which:
 - Address priority management issues in individual countries or regions;
 - Address the synergies between human effects and natural variations as causes of stress and degradation in coral reefs and related ecosystems;
 - Involve interdisciplinary research into human impacts with initial priority on fisheries and tourism;
 - Integrate traditional knowledge;
 - Quantify the socio-economic impacts of conservation and habitat destruction;
 - Address the scales and linkages of the biological communities; and
 - Develop methods for impact mitigation and reef restoration.
- Develop programs to involve communities, resource users, the private sector and others in monitoring the condition of coral reefs and related ecosystems.
- Encourage regional and international forums which bring together managers and scientists to

identify priority information requirements for management of coral reefs and related ecosystems.

Review

- Review of the state of coral reefs and related ecosystems and of action taken to implement the ICRI Framework for Action should be conducted at national, regional and international levels on a regular basis.
- The four yearly cycle of the international coral reef symposia provides an excellent opportunity to discuss the ecological condition of coral reefs. This should be matched by an equivalent program to review the effectiveness of implementation of actions in accordance with the ICRI Framework for Action. At the international level, the U.N. Commission on Sustainable Development provides an appropriate forum for review of international actions taken at all levels by governments, international organizations and agencies. The 1996 session of the Commission on Sustainable Development, with its focus on Chapter 17 (Protection of Oceans) of Agenda 21 will deal, inter alia, with coral reefs and related ecosystems.
- UNEP should be encouraged to review the implementation and success of the ICRI Framework for Action through relevant programs including the Regional Seas Programmes.
- Similarly the IOC through the Global Coral Reef Monitoring Network, should be encouraged to produce reports on the ecological condition of coral reefs and related ecosystems for discussion at the quadrennial International Coral Reef Symposia and other relevant international forums.

Approved 3 June 1995

ANNEX XIX

INTERNATIONAL CORAL REEF INITIATIVE EAST ASIAN SEAS REGIONAL STRATEGY

Background to the International Coral Reef Initiative

The International Coral Reef Initiative (ICRI) was established because of serious concern about the increasing and widespread degradation of coral reefs and their related ecosystems, including mangrove forests, seagrass beds and beaches. ICRI is a global partnership of governments, international and regional organizations, non-governmental organizations (NGOs), multilateral development banks and private sector groups. This partnership aims to increase the capacity of countries and local groups to effectively conserve and sustainably use coral reefs and related ecosystems. The key to ICRI's success will be global cooperation, effective use of existing resources and identifying effective mechanisms for implementation.

The approach of the International Coral Reef Initiative is twofold:

- (i) to raise the global commitments to conserve, restore and sustainably use coral reefs and associated environments, and
- (ii) to use and better coordinate the efforts of governments and regional organizations as well as catalyze and facilitate the development of new activities to ensure the conservation, sustainable use and management of coral reefs.

ICRI was launched at an international workshop (May, 1995, Dumaguete, Philippines) attended by 106 participants from over 40 countries representing governmental, non-governmental, international and national organizations and multilateral and bilateral donor organizations. The workshop adopted a *Call to Action* and the *Framework for Action* which provide the basis for future international cooperation and coordination to ensure the conservation and sustainable use of coral reefs and related ecosystems.

The *Framework for Action* is based on the following principles:

- The full participation and commitment of governments, local communities, donors, NGOs, the private sector, resource users and scientists is required to achieve ICRI's purpose; therefore true partnerships, cooperation and collaboration exemplify ICRI activities.
- The over-riding priority is to support actions that will have tangible, positive and measurable effects on coral reefs and related ecosystems and on the well-being of the communities which depend on these ecosystems.
- Human activities are the major cause of coral reef degradation; therefore managing coral reefs means managing those human activities. Individuals whose decisions and actions affect coral reefs—from board rooms to beaches—need to become aware of and committed to the conservation and sustainable use of coral reefs and related ecosystems.
- The diversity of cultures, traditions and governance within nations and regions should be recognized and built upon in all the ICRI activities.
- Integrated Coastal Management, (ICM), with special emphasis on community participation, provides a framework and process for the conservation and sustainable use of coral reefs and related ecosystems.
- A long-term commitment is required to develop national capacity to conserve and sustainably use coral reefs and related ecosystems and the continued improvement of coral reef management requires a permanent commitment to an adaptive approach.
- Strategic research and monitoring programmes must be an integral part of the ICRI because management of coral reefs and related ecosystems should be based on adequate scientific information.

- Actions promoted under the *Framework for Action* should take account of, and fully use, the international agreements and organizations that address issues related to coral reefs and related ecosystems. The ICRI will facilitate the leveraging and channeling of existing resources among all sectors for the benefit of coral reefs and related ecosystems.

Coral Reefs and Related Ecosystems in the East Asian Seas Region

The East Asian Seas (EAS) region is recognized as the global center of diversity for the flora and fauna of coral reefs and related ecosystems, making the conservation of the area's marine biodiversity a matter of global significance. Over 70 coral genera have been recorded from parts of Indonesia, the Philippines and the Spratly Islands, while more than 50 genera are found in other parts of the region. Seagrass and mangrove species diversity is equally impressive, with the highest numbers in the world for these plants occurring in the EAS region. The diversity of many other shallow marine species is also extraordinarily high in this region, e.g. nearly 2500 coral reef and nearshore fish species have been recorded in parts of central Indonesia and the southern Philippines.

The conservation and sustainable use of coral reefs and related ecosystems in the East Asian Seas region and the biodiversity they support is of indisputable social, economic and ecological significance. These diverse and productive ecosystems support important commercial and subsistence fisheries, providing critical sources of food and income for local communities. Tourism activities associated with coral reefs and related ecosystems are important sources of employment and foreign currency income. These inter-related ecosystems are also the location of spawning grounds and the recruitment of many marine species which migrate or are transported as larvae across the region.

Unfortunately, the marine habitats of the region are increasingly under the pressure from land-based and sea-based activities and sources of pollution which, together with overexploitation and physical damage, are resulting in the degradation and destruction of coral reefs and related ecosystems. The social, economic and ecological consequences of this are severe, especially for developing countries of the region.

The main threats to coral reefs and related ecosystems in the East Asian Seas region are:

- pollution from land-based sources-particularly sewage, fertilizers, sediment, brocades, toxic wastes, solid wastes and oil spills;
- siltation due to soil erosion resulting from unsustainable and inappropriate land-use practices;
- unsustainable exploitation of coral reef resources, including overfishing and unsustainable tourism;
- destructive fishing and collecting methods, such as the use of cyanide and explosives;
- land filling and inappropriate coastal construction;
- coastal and marine development projects undertaken with inadequate environmental impact assessment;
- channel blasting and dredging activities; and
- natural disasters (e.g. crown-of-thorns starfish infestations, cyclones, possible climate change).

Purpose of this Strategy

This Strategy was developed by participants at the ICRI East Asian Seas Regional Workshop held in Bali, Indonesia (18-22 March, 1996). The Strategy provides a basis for implementing the ICRI *Call to Action* and *Framework for Action* in the East Asian Seas region.

The Strategy seeks to identify and address common and unifying issues relevant to the conservation and sustainable use of coral reefs and related ecosystems in the East Asian Seas region. It is recognized that the individual countries within the region have their own specific needs and priorities and that these must be addressed at the national level. The purpose of this Strategy is to provide for coordinated and cooperative regional action in supporting individual countries in achieving the aims of ICRI.

The Strategy also recognizes that there are many existing programmes and processes under way within the East Asian Seas region which are addressing issues relevant to the conservation and sustainable use of coral reefs and related ecosystems. The Strategy aims to support these activities by identifying regional priorities for cooperation, coordination and the effective use of resources.

The East Asian Seas region is committed to working with other regions of the world in pursuit of sustainable management of coastal resources through the ICRI Initiative. This can be achieved by promoting the need for integrated coastal management and by sharing information and management examples in international fora, such as the Commission of Sustainable Development, APEC, the International Coral Reef Symposium and through mechanisms such as the GCRMN. The use of expertise from within the region to assist other regions is encouraged and receipt of expertise from other regions, in building our East Asian Seas regional capacity to implement the global framework for action is welcomed.

The Strategy should be implemented in the light of, and as a contribution to, relevant international instruments, agreements and activities. The implementation of this Strategy should take account of existing information and seek to complement existing projects and coordinate with existing programmes. The actions identified in this Strategy outline how the conservation and sustainable use of coral reefs and related ecosystems can be achieved within the context and priorities of the East Asian Seas region.

Coastal Management

The conservation and sustainable use of coral reefs and related ecosystems requires that human-related uses must be addressed through improved and sustained management practices to minimize or eliminate impacts. The ICRI *Framework for Action* outlines a range of management actions to achieve this, with effective Integrated Coastal Management (ICM) clearly identified as the priority approach.

ICM is a process to ensure that development and management decisions in coastal areas are integrated with environmental goals and are made with the participation of those affected. ICM also is the means to ensure that maximum benefit can be derived from sustainable use of the resources of coral reefs and related ecosystems, while minimizing conflicts and harmful effects of resource use.

Effective management of the coral reefs and related ecosystems of the East Asian Seas will require regional, national and local action. At the regional level it will involve coordination to support countries in developing and implementing management programmes. At the national level, it will require developing and implementing national policies and legislation which can provide for effective ICM, and implementing programmes which give effect to these policies and legislation. The success of these management initiatives and effective implementation will depend upon the support and involvement of all stakeholders, particularly local people and resource users.

Goal I:

To provide for the conservation and sustainable use of coral reefs and related ecosystems through Integrated Coastal Management.

1.1 Policy and legislation for ICM

Objective

To develop and implement effective policies and legislation for ICM in all countries in the East Asian Seas region.

Actions

- a. Adopt the ICRI *Call to Action, Framework for Action* and the ICRI East Asian Seas Regional Strategy and incorporate their principles, objectives and actions into national policy priorities.
- b. Develop national policies and legislation for ICM.
- c. Promote coordination of agencies and cross-sectoral planning and decision-making in the policy development process.
- d. Promote linkages of national, regional and international policy and legislation.

1.2 Implementing ICM programmes

Objective

To develop and implement effective integrated coastal management programmes.

Actions

- a. Develop mechanisms for effective coordination between national, state and local agencies with responsibilities relevant to coral reef management.
- b. Develop and implement measures to control and minimize pollution from land-based and sea-based activities, bearing in mind the Global Plan of Action for the Protection of the Marine Environment from Land Based Activities.
- c. Ensure that marine resource harvesting is sustainable, including adopting a precautionary approach when information on sustainable levels of harvest is lacking.
- d. Prohibit destructive fishing methods, such as the use of cyanide and explosives.
- e. Ensure coastal and marine development is environmentally sound, through practices such as:
 - EIA's of development projects;
 - effective management of tourism and recreational activities;
 - minimizing and controlling land filling activities;
 - minimizing the adverse impacts of Mariculture;
 - ensuring coastal engineering and construction practices are environmentally sound;
 - minimizing the adverse impacts of dredging, channel blasting and mining.
- f. Develop effective marine protected area systems including the preparation and implementation of management plans.
- g. Monitor and evaluate the success of ICM programmes.
- h. Encourage member countries, through agreements, to participate in regional projects and programmes which address ICM.

1.3 Access and equity in the use of the resources of coral reefs and related ecosystems

Objective

To address issues relevant to social equity, poverty, access and rational resource utilization in the conservation and sustainable use of coral reefs and related ecosystems.

Actions

- a. Develop and implement resource management strategies which ensure equitable, reasonable and sustainable resource allocation and use.
- b. Ensure that ICM programmes address social, economic and cultural considerations, particularly the needs of local people.
- c. Develop income generation alternatives to unsustainable use of coral reefs and related ecosystems.
- d. Develop and promote the use of appropriate environmentally friendly technology in the conservation and sustainable use of coral reefs and related ecosystems.

1.4 Reflecting the economic and other values of coral reefs in decision-making

Objective

To ensure that the economic and other values of coral reefs and related ecosystems are reflected in decisions about the use and development of coastal and marine resources.

Actions

- a. Adopt resource accounting and include the value of coral reef and related resources in these calculations.
- b. Develop and apply techniques of economic and other forms of valuation of coral reefs and related ecosystems to ensure the long term values are considered in the development planning process, e.g., coastal tourism, and resource use, fisheries.
- c. Develop and apply economic incentives and instruments which promote the conservation and sustainable use of coral reefs.

Capacity Building

The ICRI *Framework for Action* stresses the importance of capacity building in order to strengthen the human resources and institutional capabilities for ICM, research and monitoring, and training and education.

The national reports presented at the ICRI East Asian Seas Regional Workshop make it clear that the capacity of countries in the East Asian Seas region to conserve and sustainably use coral reefs and related ecosystems varies from country to country.

It is essential to develop the capacity of governments, institutions and individuals to levels necessary to achieve the conservation and sustainable use of coral reefs and related ecosystems. Increasing the capacity of governments, institutions and individuals will be facilitated by increased awareness and understanding of the importance of these ecosystems. The development and dissemination of relevant information and knowledge on the environmental, social and economic importance of these ecosystems is therefore an essential element of capacity building.

Co-ordination and adequate financing are also critical to implement and sustain the development of human and institutional capacities.

Goal II:

To strengthen the capacity of governments, institutions, communities and individuals to conserve and sustainably use coral reefs and related ecosystems.

2.1 Developing and strengthening public awareness and education

Objective

To develop and strengthen public awareness and education on issues relevant to the conservation and sustainable use of coral reefs and related ecosystems.

Actions

- a. Develop co-operative public awareness, education, and training programmes involving NGO groups, scientists, the private sector and government agencies.
- b. Improve linkages and co-ordination between NGOs, scientists, the private sector and government agencies, in order to transfer relevant ICM skills and knowledge.
- c. Facilitate the exchange of information, experts, managers, and government officials between and within countries.
- d. Utilize educational materials to educate relevant stakeholders, including the private sector and its clientele, and encourage their participation in public awareness and education.
- e. Utilize all forms of media to promote awareness of unsustainable activity and of positive actions that can be adopted by all user groups and develop programmes and initiatives to train media people involved in environmental issues.
- f. Identify the co-ordinating organizations to facilitate the development of co-operative public awareness, education, and training programmes, e.g., IUCN, EAS-RCU.
- g. Develop an East Asian Seas regional coral reef awareness campaign as part of activities carried out under the International Year of the Reef in 1997.

2.2 Enhancing community participation in ICM

Objective

To ensure the effective participation of all sectors of society in the conservation and sustainable use of coral reefs and related ecosystems.

Actions

- a. Ensure effective consultation with and among all interest groups in the management of coral reefs and

related ecosystems.

- b. Promote and implement community-based management as a means to involve the local population, NGOs and interest groups in the conservation and sustainable use of coral reefs and related ecosystems.
- c. Implement programmes and initiatives, including training, to develop and strengthen community organizations and regional networks and facilitate community involvement in ICM.
- d. Document traditional community management practices and uses of marine organisms and habitats.
- e. Improve opportunities for consultation on coastal and marine issues between local organizations, private sector, academic institutions, other user groups and the general public, through fora and public symposia on ICM.
- f. Promote successful pilot demonstration programmes and projects and the transfer of information on the successes and failures of efforts to conserve and sustainably use coral reefs and related ecosystems.
- g. Further develop information exchange networks, e.g., Internet, workshops, symposia to improve the opportunity for informed decisions to be made, for successes to be replicated and to learn from mistakes.

2.3 Strengthening institutional capacity for ICM

Objective

To strengthen the capacity of institutions with responsibilities relevant to the conservation and sustainable use of coral reefs and related ecosystems.

Actions

- a. Develop programmes and initiatives to train ICM trainers at the regional and national level in applicable fields.
 - b. Encourage and assist countries to become self-sufficient in developing institutional capacity for ICM.
 - c. Develop, strengthen and expand country training programmes in the EAS region, e.g., seagrass and mangrove management, reef restoration and protection.
 - d. Establish and identify centers and programmes of excellence within the region and within countries and develop networks between centers.
 - e. Enhance the capabilities of regional organizations to support in-country programmes through assistance in identifying funding sources, arranging travel support and providing training.
 - f. Strengthen the capability of research institutions to address management issues, e.g., better facilities for addressing cyanide fishing.
 - g. Develop, distribute and maintain a directory of institutions and organizations (e.g., on their capabilities, expertise) to encourage the exchange of personnel, information and publications.
- ### 2.4 Regional co-operation for co-ordination of ICM policies and programmes

Objective

To develop and strengthen co-ordinated policies and programmes for ICM through increased regional co-operation.

Actions

- a. Integrate inland, coastal and offshore management initiatives and mechanisms to optimize synergies.
- b. Assist in the adoption and implementation of regional and global conventions and protocols and use these fora to address the conservation and sustainable use of coral reefs and related ecosystems.
- c. Seek to minimize or resolve environmental conflicts and impacts in the region through co-operative efforts.

2.5 legal and enforcement measures

Objective

Develop and strengthen the capacity to adopt and apply legal, enforcement and policy measures relevant to the conservation and sustainable management of coral reefs and related ecosystems.

Actions

- a. Recognize community-based sustainable management practices in the development of legal enforcement measures.
- b. Facilitate the sharing of experience and expertise in the conservation and management of coral reefs and related ecosystems to aid in developing legal and enforcement capacity.
- c. Develop and disseminate optimal enforcement methods to assist in the effective management of coastal resources.
- d. Enforce the prohibition of destructive fishing methods, such as the use of cyanide and explosives.
- e. Explore opportunities for regional co-operation on enforcement relevant to the management of coral reefs and related ecosystems.
- f. Compile information on the valuation of coastal ecosystems and identify mechanisms to assess accountability for and damages to coral reefs and related ecosystems.

2.6 networking

Objective

To have the capacity for effective intra-regional communication through the establishment of a regional node and a communication network of universities, research institutes, scientific museums libraries, management and government authorities.

Actions

- a. Hold regular regional workshops of scientists, resource managers and stakeholders to intercalibrate methods, examine case studies, and share experiences.
- b. Establish the capacity to respond to urgent regional environmental needs through workshops and establishing regional task groups.
- c. Set up a system of networking that provides continuous and open channels of communication within and between countries.
- d. Provide mechanisms for training at all levels on resource use assessment and management including establishing standard sites to allow truly regional comparisons.
- e. Establish a regional node to coordinate communication, training, workshops and database operations, including permanent reference sites.
- f. Encourage coordination and communication among regional scientific museums and libraries, universities and institutes.
- g. Encourage systems of communicating important resource and monitoring issues, problems and solutions, through multimedia mechanisms including Internet, newspapers, radio, television, posters, school kits, etc.

2.7 Databases

Objective

To have the capacity to develop and maintain functional regional and national databases that contain current data, literature references, and inventories of research and management resources.

Actions

- a. Encourage the establishment of suitably equipped and staffed national and regional environmental databases with links to the Global Coral Reef Monitoring Network and ReefBase that contain standardized structures to incorporate updated data holdings, relevant literature, and research and management resources.
- b. Develop national and regional repositories of all coral reef and related ecosystems literature with an emphasis on materials that are difficult to obtain, e.g., NGO reports, gray literature.
- c. Train people from the region in the principles and protocols of database operations and continually upgrade this training at all levels.
- d. Ensure that all countries have facilities to access regional databases.

Research and Monitoring

There are distinct regional problems and issues in the East Asian Seas that require directed question-driven research to ensure that coastal resources can be sustainably maintained and managed. Many of these issues need to be addressed collectively on a regional scale, utilizing and developing the expertise and facilities of countries throughout the region. Environmental and social scientists, and managers involved in research and monitoring need to ensure that the questions they tackle are developed in consultation with all stakeholders. The answers and benefits arising from this research must be disseminated to the wider community at all levels from government through to subsistence fishers and users.

The nature of the information required to support well-informed management decision making is such that inter-disciplinary programmes are essential. This is reflected in many of the actions identified below.

Goal III :

To answer key management questions for the conservation and sustainable use of coral reefs and related ecosystems through the effective use of existing research and monitoring information, and the further development of appropriate research and monitoring activities.

3.1 Research and monitoring to support management programmes

Objective

To utilize strategic research (including social research) to provide decision makers with appropriate information to facilitate informed management decisions and ensure sustainable use of coastal resources.

Actions

- a. Ensure that managers and scientists work together to :
 - define management questions for which research and monitoring can provide answer; and
 - design and develop research and monitoring programmes to address these questions.
- b. Promote strategic research and encourage cooperative research on the basic biology of reef communities (fishes, corals, diseases and predators including *Acanthaster* and *Drupella*).
- c. Promote research on the impacts of land-based pollution.
- d. Encourage multi-national, inter-disciplinary, intra-regional research addressing large scale issues such as interconnectivity of larvae, Transboundary pollution, migratory species, and effects of global climate change.
- e. Develop scientific criteria to assist in resource management planning. MPA establishment and management and develop and refine methods for predictive assessment, monitoring and management of Environmental Impact Assessment (EIA).
- f. Assist in the conservation of endangered and threatened species by providing information on their biology, ecology, migration patterns, and identifying habitat areas that require special protection.
- g. conduct research on the extent of destructive fishing methods such as explosive and cyanide fishing and their specific impacts and rates of recovery.
- h. Conduct scientific and social research on the impacts of tourism and aquaculture.
- i. Encourage research on alternative sustainable uses of coral reefs and related ecosystems such as the search for bioactive compounds.

3.2 Monitoring

Objective

To establish a regional monitoring network to provide regular reports on ecosystem status and trends.

Actions

- a. Encourage the collection, analysis and interpretation of information on the status of coral reefs and related ecosystems to enhance the management and sustainable use of these resources.
- b. Use standardized methodologies to establish and develop monitoring programmes in countries, to assess resource status and trends.
- c. Encourage participation in monitoring as a regional node of the Global Coral Reef Monitoring Network.
- d. Where appropriate, encourage institutions across the region to introduce and develop the capacity for monitoring and remote sensing, and to assist others with analysis and interpretation of the resulting data.

3.3 Research and monitoring methodology

Objective

To ensure that standard methods are applied consistently and evenly across the region to improve the capacity to assess and manage resources and to allow questions on a regional scale to be addressed.

Actions

- a. Promote the training and equipping of all countries across the region for underwater marine research.
- b. Recognize the need to use standard methods within all countries of the region.
- c. Encourage research cooperation to intercalibrate and exchange methodologies.
- d. Assist countries in efforts to translate and adapt methods for use at the local level whilst maintaining the basic methods of monitoring.
- e. Encourage the development of new and appropriate methods for assessing degradation; the level of sustainability; and Mariculture of critical species.

3.4 Biodiversity of the East Asian Seas.

Objective

In recognizing that the East Asian Seas region is the global centre of marine biodiversity, to understand further the processes that contribute to this biodiversity so that it can be maintained through time.

Actions:

- a. Develop and update inventories of the species of the EAS region, emphasizing those species that are endangered and threatened.
- b. Identify areas important and suitable for the effective protection of coastal and marine biodiversity.
- c. Encourage basic research in taxonomy and biogeography.
- d. Establish and encourage the maintenance of museum collections and curatorships through the provision of scholarships and employment opportunities.
- e. Encourage the establishment of regional networks of marine protected areas to ensure maintenance of marine biodiversity.

3.5 Recovery and rehabilitation

Objective

To accelerate rates of natural recovery of coastal resources and restoration of natural processes through rehabilitation.

Actions

- a. Identify sites within countries and the region that are suitable for rehabilitation.
- b. Ensure that causes of degradation are removed where possible and ensure protection of areas during and after rehabilitation.
- c. Encourage research and develop techniques to rehabilitate coral reefs and related ecosystems.
- d. Share information within the region and with other regions through cooperative research on the

effectiveness and methods of rehabilitation.

- e. Monitor and evaluate both the beneficial and adverse effects of ecosystem rehabilitation.

Mechanisms for coordination, Implementation and Review of ICRI-Related Activities

The ICRI Framework for Action identifies the role of ICRI to facilitate the leveraging and channeling of existing resources among all sectors for the benefit of coral reefs and related ecosystems. Fulfilling this role depends on developing mechanisms for coordination of ICRI activities at the local, national, regional and international levels.

The ICRI EAS regional strategy has been developed to support the country implementation of the Framework for Action. This section aims to identify the possible coordinating and funding mechanisms to support the implementation of the regional strategy. Sustainable and long term funding focusing on the principles of this strategy is seen as the key to the implementation of this strategy.

Existing programmes and initiatives should be used in a way which make the most effective use of the scarce resources available.

Monitoring and evaluation are identified as critical requirements to ensure that funding is used efficiently and effectively and that the regional strategy is met in the long term.

4.1 mechanisms for coordination of ICRI activities

Objective

To ensure the effective coordination of ICRI activities in the East Asian Seas at the local, national, regional and international levels.

Actions

- a. Ensure that there are mechanisms for effective international coordination of ICRI activities across and between all regions and that the East Asian Seas is appropriately represented in these mechanisms.
- b. Promote coordination and collaboration between international and regional, governmental and non-governmental organizations which are carrying out programmes relevant to the conservation and sustainable use of coral reefs in the East Asian Seas.
- c. Develop a mechanism for facilitating coordination of ICRI activities within the East Asian Seas region and assisting the in-country implementation of activities outlined in this Strategy.
- d. Where appropriate, identify a key national agency or agencies with responsibility for national and local coordination.
- e. The UNEP Coordinating Body for the Seas of East Asia should consider the feasibility of the UNEP Regional Seas Regional Coordinating Unit (EAS/RCU) taking on the role of hosting the coordination of ICRI for the EAS region.

4.2. Financing the Strategy

Objective

To develop sustainable financing to ensure the effective long term conservation and sustainable use of coral reefs and related ecosystems.

Actions

- a. Encourage partnerships with the private sector which generate sustainable funding of ICM.
- b. Develop innovative financing mechanisms consistent with the 'user pays' principle and allocate socio-economic incentives which enhance effective management.
- c. Encourage and assist countries to identify and approach funding sources.
- d. Determine regional priorities as a basis for the best use of existing funding and for seeking additional funding.
- e. Identify and target regional and international funding agencies.
- f. Encourage contributions by governments to match outside funding sources.

- g. Explore mechanisms for developing trust funds.
- h. Identify and develop additional sustainable and innovative funding mechanisms.
- i. Develop training programmes with the objective of promoting the best use of existing funding and skills for seeking additional funding.
- j. Develop criteria for seeking funding based on this Strategy.

4.3 Monitoring and evaluation

Objective

To develop mechanisms for monitoring and evaluating the effectiveness of the implementation of this Strategy

Actions

- a. Evaluate and report on funding effectiveness in meeting this strategy. Techniques may include annual reports, steering committee meetings, in-country assessments, etc.
- b. Ensure that consistent mechanisms for effective monitoring, evaluation and reporting of ICRI activities throughout the region and between regions are available.
- c. Share information with the international community on experience in the implementation of this strategy.
- d. Incorporate performance criteria reporting mechanisms within ICM programmes.
- e. Develop a timetable to review the effectiveness of the implementation of the Strategy.

plates



Venue



Discussion



Excursion (Okinawa Expo Park)



Closing Session



Dr. Kenji Konishi, chairman of the workshop at the Farewell party



Participants at the Farewell party