Training Workshop on Marine & Coastal Protected Areas (MCPA) Managers Exchange Programme

November 5-8, 2008

Training Workshop Report

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South Asia Co-operative Environment Programme
Sri Lanka

Ministry of Environment & Forests
Government of India, New Delhi

Organised by

Gujarat Ecological Education & Research Foundation
Gandhinagar, Gujarat

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CONTENT

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Background

The 5 maritime countries of the South Asia region, Bangladesh, India, Sri Lanka, Maldives and Pakistan, are characterized by extensive river deltas and diverse marine and coastal habitats, supporting some of the richest concentrations of biodiversity in the world and encompassing globally significant mangrove, sea grass, and coral reef habitats. Located alongside these coastal resources are some of the most densely populated cities in the world (Karachi, Bombay, Madras, Calcutta and Dhaka), and an estimated 400 million people are dependant on the resources for food, and to generate at least part of their livelihoods. In addition, reef based tourism activities encourage essential foreign investment, generate local employment opportunities, and comprise the mainstay of both the Sri Lanka and Maldives economies. Such coral reefs have been estimated to provide the world with US$375 billion in goods and services, which per unit area, places them among the most valuable ecosystems globally. As such, the maintenance of healthy coastal and coral reef habitats is critical in order to sustain the social and economic development of the South Asia region and protect these significant resources on behalf of the global community.

The value of Marine and Coastal Protected Areas (MCPAs) as a fundamental tool for the protection of coastal resources has been recognized by governments and scientific institutions, and all countries have established MCPAs. The distribution of marine and coastal resources across the region is variable however, and marked differences exist in the legislative provisions, governance, infrastructure, and technical resource management capabilities of each nation. Whilst the bio-geographic representation and total coverage of MCPAs has increased, capabilities to implement MCPA management plans and enforce existing regulations have not evolved at an equal rate. Consequently, national legislation is not adequately translated into suitable strategies and physical actions on the ground, which would lead to tangible outputs and effective contributions towards the successful and sustainable management of MCPAs. The majority of existing MCPAs are failing to adequately protect critical coastal habitats or to ensure the well-being of dependant coastal communities.

While an effectively managed isolated MCPA site will produce local rewards, a networked approach to marine resource conservation is considered more effective for the protection of biological diversity. The expansion of protected area networks is therefore a principal requirement of the region in order to ensure the food and livelihood security of coastal populations and achieve MEA targets. The CBD COP7 guidance for the development of a national marine and coastal biodiversity management framework states that ‘for countries with no highly protected marine and coastal protected areas, the first step should be to develop the first few marine and coastal protected areas, and the necessary mechanisms to allow future marine and coastal protected areas and networks to be developed’. The optimization of management strategies, generation of human and technical capacity, and implementation and

enforcement of measures in existing MCPA sites is therefore the first priority of the region if the international targets are to be achieved within the specified timeframes.

By moving one step ahead in this direction, a four-day training workshop on "Marine and Costal Protected Area (MCPA) Managers Exchange Programme" was jointly sponsored by South Asia Co-operative Environment Programme (SACEP)-an inter-governmental organization, established in 1982 by Governments of south Asia to promote and support protection, management and enhancement of the environment in the region- and Ministry of Environment and Forests, Government of India and Gujarat Ecological Education and Research (GEER) Foundation, Gandhinagar, Gujarat was identified for organizing the training workshop considering their wide experiences of research in the areas of corals and mangrove ecosystem. The workshop was organized at GEER Foundation during November 5-8, 2008. The workshop was designed in such a way that the delegates get more opportunity to share and compare experiences and spent time in the field to understand and evaluate the marine biodiversity and ecosystems with special focus on corals and mangroves.

The Workshop objectives

The training workshop was designed to achieve following objectives:

1. To share experiences in the areas of the coral habitat and species diversity, planning, monitoring, evaluation, research, awareness and capacity building, tourism and recreation, legislative and institutional frameworks to understand the present scenario of South Asian countries in the context of coral reefs management.

2. To enhance the skills of the managers in the areas of coral and marine biodiversity and conservation status of the area

3. To identify common areas of interest for networking and evolve future action plan for coral reefs conservation.

Training Workshop Strategy

The training workshop was designed in three parts. Part – I was planned to share and understand the status - coral habitat and species diversity, planning, monitoring, evaluation, research, awareness and capacity building, tourism and recreation, legislative and institutional frameworks of Coral Reefs in South Asian Countries. Part-II was designed to enhance the managerial skills of the delegates in assessing the coral diversity, abundance and status of corals in the field by field visits at two places at Marine National Park, Jamnagar. Part-III was designed to enhance scientific knowledge of Marine Biodiversity and its linkages with each others.

For facilitation and bridging the gaps and linking the sessions with each other national level resource persons like Dr. J R Bhatt, Director, MoEF, Dr. K Venkataraman, Secretary, National Biodiversity Authority, Shri. C N Pandey, Director, GEER Foundation and Dr. M Wafar, Sr. Scientist, National Institute of Oceanography were invited to remain present all through out the workshop including field visits. For the field visit to assess the status and biodiversity of corals,

Dr. Y Prasanna, Scientist, Zoological Survey of India, Shri. D S Narve, Conservator of Forests, Marine National Park, Shri. S P Jani, the former Dy.C.F. of Marine National Park (who was also one of the Indian delegates) and resource persons from local Forest Department, who had rich experience of working at Marine National Park, were invited to take inventory at Gulf of Kachchh. Part-III was dealt with by Shri. Pradeep Khanna, IFS, PCCF (WL), Gujarat State, Dr. K Ventakataraman, Shri C N Pandey, Dr. Wafar, Dr. Patterson Edward, Suganthi Devadason Marine Research Institute (SDMRI), Tuticorin, Tamil Nadu, Dr. Ketan Tatu, Dr. Hemal Kanvinde, Dr. Dhiresh Joshi, Shri. C H Pandya, Shri. Vijay Patel provided scientific knowledge on coral research scenario, people's participation in Marine bio-resource management, the role of industry in coral conservation, coral transplantation efforts in the country etc. Thus, all the three objectives of the workshop were fulfilled by providing rich content, building the skills of biodiversity assessment in the field by providing flexible, logical sequenced and conducive learning environment by the experienced resource persons.

Learning / Take-home material

The delegates were provided learning material specially developed keep in view the objectives of the workshop. They included :

1. Compendium of Reference Articles by GEER Foundation
2. Field guide on "Corals, Mangroves and Major Marine Biodiversity of Gujarat" A field guide with photographs for field identification of corals (hard and soft), invertebrates-sponges, mollusca etc., vertebrates – reptiles, fishes etc. and avifauna, algae and mangroves and mangrove associates by GEER Foundation
3. SACEP News Letters
4. Biodiversity Conservation in Gulf of Mannar Biosphere Reserve by NBA, Chennai
5. IUCN Publications on "Systematic Approaches to Livelihoods Enhancement and Diversification - a review of global experiences and "Sustainable Livelihoods Enhancement And Diversification (SLED)" A manual for practitioners
6. 101 Questions on Corals by NIO, Goa
7. Socioeconomic Monitoring Guideline for Coastal Managers in South Asia by CORDIO, IUCN, ICRAN etc.
8. Managing Marine and Coastal Protected Areas: A Toolkit for South Asia, prepared by IUCN, ICRAN and CORDIO, 2008.
9. Status and Protection on Coral Reefs (STAPCOR)-08 - A seminar report U.T of Lakshadweep
10. Questionnaire on Marine and Coastal Protected Area Web Portal

Day-1 5th November 2008

The Inaugural Programme

The training workshop was aimed to provide a regional forum for practical management aspects on the Marine and Coastal Protected Areas in the five maritime countries of South Asia.

The inaugural programme was held on 5th November, 2008 in which Hon'ble Minister of Environment and Forests Shri Mangubhai Patel was invited as Chief Guest and Hon'ble Minister of State Shri Kiritsinh Rana was invited as guest of honor to this programme. The other invited dignitaries on the dias included Dr. A A Boaz, IFS, Director General, SACEP, Dr.S K Nanda, IAS, Principal Secretary, Forests and Environment Department, Gujrat State, Dr. B P Nilartna, IAS, Joint Secretary, Ministry of Environment and Forests, Government of India and Chairman of South Asia Coral Reef Task Force (SACRTF), Dr. M L Sharma, IFS Principal Chief Conservator of Forests, Gujarat State, Shri. Pradeep Khanna, IFS, Principal Chief Conservator of Forests (Wildlife), Gujarat State and Shri. C.N. Pandey, IFS, Director GEER Foundation, Gandhinagar.

Welcome address by Shri C N Pandey, Director, GEER Foundation

After welcoming the dignitaries on dias by presenting flowers, Shri. C N Pandey welcomed the dignitaries on dias and the delegates from different countries and gave brief introduction of activities of GEER Foundation. He mentioned that the foundation has done pioneering work in the field of biodiversity studies and have completed studies of more than 13 sanctuaries and national parks of the state. The Foundation has, through its research activities, contributed in preparing management action plans of various sanctuaries and national parks. The Foundation has also undertaken biodiversity study of marine national park at Gulf of Kachhch and documented the existing marine flora and fauna, which also includes 41 hard coral and 10 soft coral species. Presently, The Foundation has taken up studies on pollination biology in different species of Mangroves. Thus, foundation has rich experience of working with marine biodiversity and issues related to its conservation.

The training workshop is designed to focus on experience sharing in the areas of the coral habitat

and species diversity, planning, monitoring, evaluation, research, awareness and capacity building, tourism and recreation, legislative and institutional frameworks to understand the present scenario of South Asian countries in the context of coral area management and conservation and identify common areas of interest for networking and evolve future action plan for coral Reefs conservation. He emphasized that the workshop was to provide an ideal platform to apply appropriate strategic action to manage the MCPAs of South Asian region.

Later, the training workshop was inaugurated by Hon'ble Minister of Environment and Forests Shri Mangubhai Patel by lighting the lamp. He also released a video film on "Marine Biodiversity of Gulf of Kachhch" produced by GEER Foundation.

Keynote address by Hon'ble Minster, Forests and Environment, Gujarat State Shri Mangubhai Patel

In his keynote address Hon'ble Minister of Forests and Environment, Gujarat State Shri Mangubhai Patel mentioned that Gujarat State is recognized as one of the most industrially developed states of the country. You all would be pleased to know that harbors and nurtures a myriad of biodiversity. Gujarat State is known for its unique and valuable diversity of wildlife. The major wildlife of the state comprises the rare mammals like Lion, Wild Ass, Leopard, Bear, Caracal, Rusty Spotted Cat, Desert Cat, Pangolin, Ratel etc., very high population of avifauna that includes very rare birds like Great Indian Bustard, Lesser Florican, Black Necked Stork, Sarus Crane etc. The wetlands of the state also harbor great diversity of birds. The State being on the route of the migratory birds is a preferred wintering ground for them. There are 24 Sanctuaries and 4 National Parks in the State and the conservation status and the peoples Cooperation are so good that in this state the birds are found inhabiting area in close proximity of human habitations and are found totally undisturbed by humans.

This programme has been organized in Gujarat, which is quite justified also because the state has around 1600 km's long coastline, where there is plenty of marine biodiversity. The state can boast about having the first Marine National Park at Jamnagar in Gulf of Kachchh, which is among the three major gulfs of the country. The state has two Gulfs, the other being Gulf of Khambhat. The Gulf of Kachchh is also among the four major coral reef areas of the country. The Marine National Park is dotted with small islands among which the islands such as Pirotan, Kalubhar etc. which are famous for coral reef and mangrove areas. Besides corals, this area is pulsating with other marine biodiversity such as octopus, brittle star, starfish, bivalve, sea-anemone, puffer fish, jelly fish, crab, turtle, Dolphin etc.

The coral reef ecosystem is considered equal to the tropical rainforest ecosystem, in terms of biodiversity. Every organism in this typical ecosystem has a special significance. It is believed that there are numerous life forms in this area which have future potential remedies for various

human ailments. The fishes found on the coral reefs of the world decorate the aquaria in the drawing rooms in homes world over. Also the coastal communities are also dependant upon these areas for their livelihood. In this context, also therefore, it is important that we conserve these highly fragile ecosystems of the world.

I am pleased to know that the maritime countries of South Asia have good extent of coral reef areas. These countries are alert and quite active in the field of conservation of these ecosystems and have certain coastal areas under the Marine Protected Areas. They have covered the majority of the biodiversity of these areas under various wildlife related laws, thereby according it the highest conservation status. The results of these efforts are highly encouraging. I know that the participants of this workshop from different nations have wide experience of management and the problems encountered during the implementation of conservation programs. They would surely exchange their ideas and experiences in this workshop with other dignitaries/participants and many new strategies /ideas would emerge during such interactions. I hope organizing such international workshop involving managers of the coral reef areas, which are considered to be highly sensitive and fragile, is a great step forward in the direction of conservation of marine biodiversity and corals.

It is pertinent to note that in the present context when it is also necessary to favor development to provide employment to ever increasing human population, the management of Nature requires more scientific approach. In the entire world, most of the industrial development activities are concentrated on coastal areas, which necessitate more attention on management of coral reef areas. Therefore, I believe that this effort of SACEP, a body specially constituted by the governments of South Asian countries, is highly praiseworthy. I also appreciate the contribution of Ministry of Environment and Forests, Government of India, which has accorded priority to conservation of coral reef areas. I also congratulate GEER Foundation which has always taken lead in organizing such programs. Thanks are also due to different nations who have sent their delegates to deliberate upon such an important issue so that the conservation efforts of coral reefs in South Asia move forward with better understanding. I once again welcome you to the state of Gujarat.

Address of Dr. Arvind Anil Boaz, Director General, SACEP

Dr. Boaz in his address welcomed the delegates who are managers of Marine and Coastal Protected Areas (MCPA) in the South Asian Region. The interest of delegates reflects the importance of the present initiative and he hoped that their contributions to the growing body of knowledge and hand-holding initiatives in the Marine and Coastal Protected Areas (MCPA) will be valuable to consolidate and strengthen the way forward to address challenges in MCPAs at the regional level in South Asia.

South Asian countries show a wide range of variation in climate, altitude and physiography. The 5 maritime countries of the South Asia region, Bangladesh, India, Sri Lanka, Maldives and Pakistan, are characterised by extensive river deltas and diverse marine and coastal habitats, supporting some of the richest concentrations of biodiversity in the world and encompassing globally significant mangrove, sea grass, and coral reef habitats. Located alongside these coastal resources are some of the most densely populated cities in the world (Karachi, Bombay, Madras,

Calcutta and Dhaka), and an estimated 400 million people are dependant on the resources for food, and to generate at least part of their livelihoods. In addition, reef based tourism activities encourage essential foreign investment, generate local employment opportunities, and comprise the mainstay of both the Sri Lanka and Maldives economies. Such coral reefs have been estimated to provide the world with US$375 billion in goods and services, which per unit area, places them among the most valuable ecosystems globally. As such, the maintenance of healthy coastal and coral reef habitats is critical in order to sustain the social and economic development of the South Asia region and protect these significant resources on behalf of the global community.

The objective of the meeting is to share the experience of participants from each of the following broad toolkit categories and use it as a resource during the training.

- Legislative and institutional frameworks
- Participatory Processes
- Planning and Reporting
- Human Resources
- Finances
- Equipment and infrastructure
- Monitoring, Evaluation and Research
- Habitat and species
- Fisheries
- Tourism, Recreation and Education
- Coastal development and Shipping

You may deliberate on these aspects.

There have been a number of important workshops and activities to build and develop capacity in the region, as well as provide opportunities for exchanging information and knowledge, and raising the profile of the importance of coral reefs and MCPAs.

Activities highlights include:

Developing a more systematic approach to livelihood enhancement and diversification which responds to the actual realities and needs of coastal communities.
Convening a workshop (December, 2008) on Coral Reef Crime Scene Investigation to enhance and improve resources to enforce MCPA regulations, and to provide training for field investigators in investigative, forensic and rapid ecological assessment techniques. This will ensure accurate assessment and data collection, and maximize prosecution, mitigation, or negotiation success.

Producing an MPA Managers Toolkit for South Asia (very successful workshop held in the Maldives two months ago) – this officially launched at the World Conservation Congress held in Barcelona, October.

South Asia Coral Reef Task Force has been recognized at a number of regional and international venues.

The establishment of the South Asia Coral Reef Task Force (SACRTF) was done to facilitate and coordinate in the management of coral reefs and associated ecosystems at a national level, and to promote collaborative action at the regional level, encouraging trans-boundary responses to shared environmental challenges and raising the political and public profile of coral reef related issues in the South Asia region, which was endorsed by the country governments of the 5 maritime nations of South Asia, at the SACEP 10th Governing Council (GC) Meeting and further ratified by the 11th GC.

This workshop is convened to discuss the management of MCPA so as to ensure that a nodal unit/representative can be mandated to undertake specific responsibilities, To the review and preparation of a strategy for enhanced communications between sectors involved in MCPA management and operation within the South Asia region.

I am confident that the result of our deliberations here will help us to take immediate steps to create a South Asian forum for enhancing the preparedness to face the challenges posed by the global climate change to regional flora and ecosystems.

Address by Dr. S K Nanda, IAS, Principal Secretary, Forests and Environment Department, Gujarat State.

Dr. S K Nanda in his addressed mentioned that Marine Bio-resource are used for food, medicine and recreations. There conservation is essential for long term sustenance of human beings. The industry and developmental activities may cause harm to these resources. It is now high time to develop a network to deal with trans-boundary issues and joint actions for conservation of marine resources. The managers of marine and coastal protected areas need to develop understating on social, economic, legal and policy issues and enhance their understanding about marine eco-systems and role of biodiversity.

South Asia Co-operative Environment Programme (SACEP) is a step in this direction in which Governments of five countries of South Asia have joined their hands to network and collectively take effective programme for coral reef conservation. The network has to develop common procedures, skill up-gradation programme, communication strategy and institutional strengthening programme, data storage and identify, research areas etc. so that effective conservation measures can be planned out for South Asia..

Address by Dr. B P Nilartna Joint Secretary, Ministry of Environment and Forests, Government of India and Chairman of SACRTF

SACEP is an inter-government organization supported by the five South Asian countries having coastal areas and coral reefs. A task force namely South Asia Coral Reef Task Force (SACRTF) has been established to conceptualize, plan, implement and monitor and evaluation of the coral reef conservation programme in the partner countries. The training workshop is an outcome of the

discussions and decision taken in the meeting of SACRTF. The status and health of the coral reefs are changing. Therefore, it is necessary to understand the causes of such change and it has to be scientifically tackled so that the health of coral reefs is maintained. People have a key role in managing and sustaining our marine resources. The task force is regularly and frequently meeting to plan, implement and monitor the activities of SACEP.

This workshop has been planned to enhance the understanding of the MCPA managers and develop their skills in assessing the status and health of coral areas. The workshop will be useful in developing perspective of information, data generation, record keeping, monitoring and evaluation, research and role of people's participation in the conservation and management of coral reefs. I wish great success to the workshop.

Vote of thanks

At the end of inaugural programme vote of thanks was proposed by Dr. Ketan Tatu, Senior Scientist of GEER Foundation. He thanked Hon'ble minister forests and Environment Shri. Mangubhai Patel and Minister of State Shri Kiritsinh Rana for sparing their valuable time for the inaugural programme and for encouraging the delegates of South Asia, who have traveled long distance to participate in the workshop. Dr. Tatu thanked to other dignitaries on dias to accept our invitation to address the delegates as guest of honor to this programme. He also thanked the Ministry of Environment and Forests, Government of India, SACEP, Sri Lanka for sponsoring the workshop, the Forest and Environment Department of Gujarat State, Gujarat Forest Department, representatives of TV and press and Governments of South Asian countries like Bangladesh, India, Sri Lanka, Maldives and Pakistan for nominating for their delegates and facilitating services to them to attend the training workshop. He also thanked colleagues of GEER Foundation for their contributions in the organizing this workshop and providing various backup services. The workshop was attended by 10 delegates from 5 SACEP countries, 6 coral reefs managers from India and 6 managers of marine national park, Gujarat (Total 22 delegates). The list of participants has been presented as annexure-I, the list of Resource Persons as Annexure-II and the training workshop design as annexure-III.

TECHNICAL SESSION-1

Introduction of SACEP activities and training workshop objectives- Dr. A Boaz

This session was chaired by Dr. B P Nilartna, Joint Secretary, MoEF, GOI and Chairman of SACRTF

South Asia Cooperative Environment Programme (SACEP) - covers target countries of Bangladesh, India, Pakistan, Maldives and Sri Lanka concentrating focal areas:

Improve the effectiveness of management at existing MCPAs.
Improve information exchange and data management across the region.
Improve regional cooperation and responses to regional marine and coastal resource management challenges.
Strengthen the capacity of policy makers, planners and managers to design and implement viable livelihood diversification for poor reef users.

The environment programme primarily addresses the capacity building, communication and data management, regional coordination and livelihood enhancement and diversification. Each of the components has been well conceived and planned actions have been decided.

South Asia Coral Reef Task Force (SACRTF) has been launched with a mission statement as under:

To actively participate in, and support, the effective implementation of existing national regulations, action plans and strategies for the management of coral reefs and associated ecosystems, and to promote the development of strategic linkages for enhanced regional cooperation, and the establishment of an effective, networked system of marine and coastal protected areas in the South Asia region. SACRTF has identified following priority actions:

Communication

- Improve, and better coordinate reporting mechanisms nationally and within the region on all coral reef work
- Encourage, and support the development of capacity building and training opportunities, materials, and manuals for groups involved in coral reef programmes through skills transfer and exchange programmes.
- Increase awareness of environmental conservation and management among decision and policy makers through lobbying and exposure visits.

Research and Monitoring

- Develop a mechanism to ensure knowledge and training is shared and exchanged among the participating countries
- Encourage each country to establish national monitoring programmes for coral reefs and associated ecosystems.
- Promote both biophysical and socio economic assessment/monitoring
- Policy
- Undertake a review of existing policy related to coral reef management and conservation in the region, in collaboration with the SACRTF Patron
- Elevate the South Asia experience to the international level by engagement in ICRI.
- The SACRTF will present specific agenda items at each SACEP Governing Council meeting to raise awareness of needs, and develop political will in support the SACRTF.
- Identify strategic partnerships and linkages at the regional and international level (e.g. ICRI), in order to develop responsive and informed action plans.

A training workshop on MCPA managers exchange programme was included in the in the implementation plan of 2008. The objective of the meeting is to share the experience of participants from each of the following broad toolkit categories and use it as a resource during the training.

- Legislative and institutional frameworks
- Participatory Processes
- Planning and Reporting
- Human Resources
- Finances
- Equipment and infrastructure
- Monitoring, Evaluation and Research
- Habitat and species
- Fisheries
- Tourism, Recreation and Education
- Coastal development and Shipping

Accordingly this workshop has been planned at GEER Foundation during November 5-8, 2008. In this training workshop we have invited managers of Marine and Coastal Protected Areas of Bangladesh, India, Maldives, Pakistan and Sri Lanka with a view to sharing the experiences of marine and coastal biodiversity management and conservation and identifying common issues which can be the link for the future networking and common programme.

TECHNICAL SESSION 2

In this session presentations by the delegates of South Asia were made for sharing of their experiences of managing MCPAs in their respective countries. The session was chaired by Dr. J R Bhatt, Director, Ministry of Environment and Forests, Government of India.

The Presentation- I Bangladesh

The presentation of Bangladesh was made by Mr. MD. Shafiul Alam Chowdury, Deputy Conservator of Forests, Bangladesh.

In Bangladesh coastal protected areas and Ecologically Critical Areas (ECAs) are declared under the Wildlife (Preservation) (Amendment) Act, 1974 & Environment Conservation Act, 1995. So far seven different areas have declared as MCPAs in Bangladesh. In the Sundarbans, the main flora are Sundari, Gewa, Keora and Groan with a total of 334 plant species. About 289 terrestrial faunal species and 219 aquatic faunal species have been recorded Prominent and important mammal species include the Royal Bengal Tiger, Spotted Deer, Macaque, Wild Boar, Jackal And Indian Fishing Cats. There is a rich bird population of 315 species of which 84 are migratory. The area faces threats like Increasing demand of forest produces, Population pressure and increasing need of land, decreasing fresh water flow, lack of intensive management, uncontrolled tourist visiting the areas and Illicit felling.

To ensure conservation and sustainable use of biodiversity found in the ECAs, the Government has taken up the coastal and Wetland Biodiversity Management Project. The project was made possible with the financial assistance of the United Nations Development Program (UNDP) and Global Environment Facility (GEF). The Department of Environment (DoE) is the lead agency of the Government in the implementation of this project. The project activities are jointly undertaken by the forest department, NGOs and local communities known as co-management councils and committees.

The SACRTF could help in:

- Improving the management of existing marine protected areas; by enhancing the capabilities the staff in understanding the fragile marine eco-systems and its biodiversity, learning more about best practices of management across the South Asia region.
- Enhancing the communications, data management and reporting skills of the managers to improve upon the management for sustainable development and conservation of the MCPA areas.

The Presentation-II Maldives

The presentation of Maldives was made by Mr. Abdulla Shibau, National Project Manager, Ministry of Environment, Energy and Water, Maldives

In his presentation Mr. Shibau mentioned that Maldives has richest marine biodiversity in the region having 1200 species of reef fish 187 coral species, 5 species of sea turtles 21 species of dolphins and whales, 15 species of sharks, 400 species of molluscs and 350 species of crustaceans. Maldives has population of 3,10,000 and growth rate is 1.96%. Tourism (33%) and fishing (18%) are two major activities contributing the GDP. National Biodiversity Action Plan, Legal and Institutional framework and stakeholders involvement are some of the new developments in the country. Environmental action plan, Tourism master plan, National sustainable development strategy, Fishery, Health master plan and Island and atoll development plans are developed and initiated for execution. EIA regulation, regulation of uprooting, cutting and transport of trees, land use regulation, fisheries law and Environment Protection Act are some of the recent developments on the policy and legal framework front. The country has declared 25 marine protected areas ensuring protection of marine species and surrounding eco-system.

However, overuse of areas, lack of management plan, enforcement, lack of people's participation and support by the NGOs and regular monitoring are some of the threats to MCPAs. However, Government is active and has initiated conservation majors which includes International project funding by World Bank, GEF, UNDP, MFF and MPAS project (Australian).

The SACEP could support by generating baseline data of marine and coastal biodiversity and by enhancing capabilities of human resources involved in MCPA management.

The Presentation-III Pakistan

The presentation of Pakistan was made by Mr. Abrar Ul Hasan, Marine Zoologist, Zoological Survey Department, Pakistan

In Pakistan there is a well establish legislative framework for environmental management. There are about 11 laws pertaining to environment management executed by various authorities / bodies. However, Ministry of Environment is the principal body operating closely with Pakistan Environment Protection Council and federal and Provincial Environmental Agencies. Coordination for sustainable management of MCPAs areas needs to be strengthened with Fisheries Department, Oceanography Institute, Forests and Wildlife Department, Zoological Survey Department, Maritime Security Agency, Marine Biology Universities. Participatory processes, Building strong scientific basis, Human resource development, Equipment infrastructure, Monitoring evaluation and Research and Adequate financial support could improve the present situations.

The Presentation-IV Sri Lanka

The presentation of Sri Lanka was made by Mr. M.H. Chitrasena, Park Warden, Hikkaduwa National Park, Sri Lanka.

Sri Lanka has declared 5 National Parks and 4 Sanctuaries under MCPAs. The National Parks include Hikkaduwa, Yala, Bundala, Wilpattu, Kumana, Minneriya and Udawalawa National

Parks. The coral reefs act as source of food supply, medicine, building material. It also sustains biodiversity and attracts tourists. Anthropogenic threats are due to increasing demands of marine and coastal bio-resources for food, medicines and raw material for industries to meet the demand of growing populations, while environmental threats are due to sedimentation, storms / tsunami or enhancing growth of sea weeds etc. Lack of alternative livelihoods, community support and capabilities are also reasons for threats for MCPAs. In terms of legal framework adequate acts for fauna and flora protection and prompt and effective law enforcement is needed. Research, capacity of the staff, forum for exchange of ideas, experiences among the stakeholder groups are some of the areas involvement of the local community in MCPA conservation were SACEP can provide support.

After the presentations the chairman addressed the delegates and summarised the gist of the presentation and thanked all the delegates who made presentation and participated in the lively discussions.

Later the delegates visited Indroda Nature Park and proceeded for Marine National Park, Jamnagar.

Day-2 6th November 2008

TECHNICAL SESSION 3

Presentation-I Biodiversity of Coral Reefs in Asia-Securing the Coral Reefs by Dr. M Wafar, NIO, Goa

In this technical session Dr. M. Wafar of National Institute of Oceanography, Goa made a presentation on Biodiversity of Coral Reefs in Asia-Securing the Coral Reefs. This session was chaired by Shri. C N Pandey, Director, GEER Foundation.

Dr. Wafar reviewed the past and present situation of coral reefs and summarized the impact of human activities and changes in the oceanic environment. He said that coral reef could be secured only if we use the scientific tools like Mapping biodiversity, Assessment of productivity, Keystone species, Recording long term changes, Pollution monitoring, evaluation and Shoreline changes. In addition skills like scuba diving and use of remote sensing technique would help to understand changes at the macro level. The conservation of coral reefs should also address the economic aspect of livelihood of local people. The aesthetic, rational, cultural, dynamics of coral reefs also should be considered. The environmental issues like pollution due to human activities and protection of habitats and utilization of resources within its carrying capacity could be restricted by legal tools like laws, policies etc.

Presentation-II Facilitating Community Participation by Dr. Hemal Kanvinde, CARESS, Chennai

In this technical session Dr. Hemal Kanvinde, CARESS, Chennai made a presentation on Facilitating Community Participation in management of coral reefs. This session was chaired by Mr. Abdulla Shibau, National Project Manager, Ministry of Environment, Energy and Water, Maldives.

In this session Dr. Kanvinde shared experiences of CARESS in generating participation in management of marine and coastal areas at Lakshadweep. Dr. Kanvinde mentioned that organizing and institutionalizing community is a long term process. There are six steps to go through the process to obtain the desired institutions. They include Initiating the Participatory Process, Facilitating a CBO establishment, evolving it into a mechanism that gathers good reliable data,

Exploring livelihood options, Integrating Livelihoods with conservation and continuing the process. Initiating the participatory process will generate trust, ownership and partnership between community and resource managers. Community should be involved in the resource use and ecological monitoring to decide the control that community should exercise for coral reefs conservation.

The major lessons learnt could be summarized as under:

Process: Constant engagement and discussion needed, Skills and motivation good,Requires facilitation for feedback loops,
Results: Reliable data, very large datasets, fills a gap, Most fish caught is a few species, using few gears, in few large catches => management implications

Skills vary: While scientists might feel that data gained has limited scientific rigour, It is useful for local level management decisions,

Participatory monitoring serves important functions: Raises knowledge and awareness of ecological systems, Allows communities to assess for themselves the differences between monitoring sites, and changes over time, Hands over ownership and responsibility for monitoring natural resource conditions to the community

This data can form the basis for site selection of No-Take Zone(s), and used for monitoring effectiveness

Presentation-III Coastal and Marine Bio-resources in South Asia - *threats and management with special reference to coral reefs* by Dr. K Venkataraman, Secretary, National Biodiversity Authority, Chennai.

In this technical session Dr. K Venkataraman, Secretary, National Biodiversity Authority, Chennai made a presentation on Coastal and Marine Bioresources in South Asia - *threats and management with special reference to coral reefs*. This session was chaired by Mr. Abrar Ul Hasan, Marine Zoologist, Zoological Survey Department, Pakistan.

In his presentation Dr. Venkataraman reviewed the coral reef situation in South Asia countries namely Bangladesh, India, Maldives, Pakistan and Sri Lanka

Marine biodiversity is a rich source of food fertilizer, medicine and fodder. It has also ornamental, recreational and spiritual value. South Asia has nearly 6% of the world's coral reef.

Recent developments & management (India)

- New legislation to protect corals and reef organisms (June 2002)
- ICZM included in national policy on environment (Andaman & Nicobar and Lakshadweep for tourism development)
- Access and benefit sharing of genetic resources
- Capacity building - Coral taxonomy & monitoring, Scuba diving, MPA management under India-Australia programme.
- Coral Reef Research Institute established
- Management has improved

Recent developments & management (Maldives)

- Review of existing fisheries laws
- Model protected area system project (Aus-aid) in Addu Atoll
- Atoll ecosystem management project (GEF)
- Grouper management pilot project (ADB)
- Overall management has improved

Recent developments & management status (Sri Lanka)

- 2 new MPAs were declared.
- Special Area Management planning for 1 MPA. (ADB)
- Destructive fishing continues even within MPAs.
- Blast fishing has increased.
- Overall management is extremely weak.

Information on baseline data on ecology and coastal / marine as well as coral reef ecosystem, natural and anthropogenic threats to coral reefs, sustainable livelihood issues local and global market trends. Species listing, Red data list of IUCN, CITES appendix species, schedule species in wildlife act etc. are required to take decision on priorities in research areas, need of protection and conservation actions vulnerable species and its rejuvenation, include and exclude species from schedules of the wildlife act, permit developmental activities and participation in international conventions on biodiversity and environment. Further, information on Importance of Coral reefs as fish habitat and breeding grounds for capture fisheries, Ecology of proposed tourist resorts includes environmental importance, sensitivity to development, Livelihoods and resource use rights of local communities, International and National Markets and trends in tourism, Data on all exports and International Market demand for protected species, Information on Legislation and Policy concerning Coral reefs, Information on the products being poached, Main offences being carried out, Ecology and species available at different sites, Need information of the extractive and non extractive use value of Coral reefs, Threats to marine ecosystem along the coast to prioritize site selection, Information on location of coral reefs their extent, status, species listing, carrying capacity etc, Anthropogenic dependency on the bio-resources would be useful in taking decision on - Regulation of fisheries, trade, tourism and developmental activities, Propose new protected areas or species, Interact with other enforcement agencies and nodal institutions.

Coral reef managers network could be useful in mitigating the major issues like Trans-boundary poaching, Illegal Trade of marine animals, Sedimentation, Over fishing, Climate change,

Monitoring and management, Conservation for the future. SACEP should take initiatives in this direction by strengthening the network and through continuous dialog.

Field visit to Narara

In the afternoon delegates were taken to Narara site where Marine National Park had undertaken mangrove plantation. The site has also rich marine and coral biodiversity. The Conservator of Forests and Park director Shri D S Narve, IFS and shri P H Sata, GFS, Deputy Conservator of Forests, Marine National Park provided information about the site and its marine biodiversity by this field visit. The group had also had a chance to interact with local community residing close to the site. By and large, the community is not much dependent on the fuel and fodder on the mangrove site. However, few members of the community are dependent of fishing to meet their livelihood.

Day-3 7th November 2008
Field Visit to Pirotan Island

This entire day was planned for the field visit at Piroton Island which is about 12 km's away from Bedi Bandar, Jamnagar in the Gulf of Kachhchh. The island has around 13.28 sq.kms of area and there is no human habitation there. The area has rich marine faunal and floral biodiversity. The delegates were provided with field guide for identification of floral and faunal biodiversity of marine national park.

A brief presentation was made by Shri. D S Narve, IFS, Conservator of Forests and Director, Marine national park about the biodiversity of the park. He informed the delegates that the marine national park has floral diversity of mangroves & its associated species and faunal diversity of Phyllum Porifera (70 species of sponges (both soft and calcareous with impressive colors like pink, red, brown, blue, yellow, orange etc.), Phyllum Coelenterate (Jellyfishes, sea anemones and corals (41 of hard corals and 10 species of soft corals) species of mainly represents this group, Phyllum Echiuroidea (represented by one unique species of Bonellia), Phyllum Annelids (represented by Sabella spps., Neris spps. & Tubicolour spps. Phyllum Crustantacean, (Barnacles, Lobsters and Crabs (30 Spps.) mainly represent this animal group., Phyllum Molluscs (This invertebrate group represented by Snails, Musels, Oysters, Shells, Octopus, Sea-horse, Chiton, Sepia etc.) Phyllum Echinodermata (Feather star, Star fishes, Brittle star, Sea urchin, Sand dollars etc.) Phyllum vertebrata (Dolphin, Porpoise and Dugong). Birds (220 terrestrial and water birds spps. recorded), Amphibians and reptiles (Green sea turtle, Olive ridley turtle, Leather back turtle, Sea snakes, Saw-scaled viper etc. Fish (150-200 spps., Cartilagenous fishes e.g. Eagle ray fish, Stiny ray fish, Electric ray fish, Sharks etc. 2. Bony fishes e.g. Butterfly fish, Sole fish, Porcupine fish, Pufferfish etc.

After this brief introduction of the biodiversity of the park, the delegates were divided in to three groups and all the groups were assigned a task of recording the bio-diversity of the area and find out the proportion of live and dead corals and health of corals. For this each group was provided with the subject experts and they jointly carried out exercise in the field. The groups worked in the field with great interest and brought their findings. At the end of the day, all the three groups made presentations. The gist of their findings are given below. The list of group members is given as annexure-IV.

Group-1 Team leader: Shri S P Jani, DCF, Godhra

All the team members walked up to low tidal lines and observed that sub tidal area may have better coral diversities. The team realized that there is lot of silt load over the live corals, however, it has hardly any effect on the coral growth and its regeneration. Overall observation was that there was increase in the number of zooanthus and significant increase in Bonellia populations. They were abundant on all poritis spp.

The team also observed that the sea grass cover was significant, particularly hallophila ovalis was quite abundant, even other spp.[desmodia ?] was also evident which suggest that herbivore like sea turtle other shrimp, oyster and fish population might be visiting this site but it is a matter of study and only after that it can be proved. The following animals were found during transects.

1 Cerethidia, 2 Tube worm, 3 christmas tree worm, 4 sabbela, 5 Neptune crab, 6 wooly crab, 6 holothurian, 7 seaanemone, 8coral spp., 9 Bonnelia, 10 brittle star, 11 sponges, 12 urithro, 13 puffer fish, 14mud crab.

Over all every group member was impressed by the marine biodiversity of Pirotan Island and were surprised to see the level of receding of water during low tide.

Group-2 Team leader Dr. K Venkataraman, Secretary, National Biodiversity Authority, Chennai

On behalf of Group-2 the field work presentation was by S.Shenbagamoorthy, Wildlife Warden, Gulf of Mannar Marine National park, Ramanathapuram (Tamil Nadu).

The groups wanted to study the Bio diversity of corals on the low tide area of the Pirotan island. The group followed “Line Intercept Technique (LIT)“ for biodiversity study. Randomly a 10 metre line was drawn with a tape and then the various objects found below the tape was recorded. Generally it contained mud / sand, coral, dead coral, algae and coral with algae. Then the percentage of the silt, coral was calculated. For a study minimum of 10 LITs are to be laid. The group could lay four LITs and found the result as below.

Sl. No.	Object/ species	LIT1 percentage	LIT2 Percentage	LIT3 percentage	LIT4 percentage
1	Silt	70.00	44.00	73.50	34.50
2	CM	13.50	31.50	17.00	45.50
3	DC	6.00	--	9.50	20.00
4	DCA	1.50	5.00	--	--
5	CA	2.00	2.00	--	--
6	Coral Rubble	7.00	15.50	--	--
7	Algae	--	2.00	--	--
	Total	100.00	100.00	100.00	100.00

CM : Coral Massive
DC : Dead Coral
DCA : Dead Coral with Algae
CA : Coral with algae
CR : Coral rubble

Findings : The team observed that the percentage and diversity of corals was increasing towards seaward side. The coral and other species found are listed below:-
Favia speciosa, Favia favus, Favites bestae, Favites complanata, Porites lutea, Porites solida, Cyphastrea seraillia, Jelly fish, Octopus, Sponges, Brown algae, Padina species, Ulva species, Sargassum species and Caulurpa species

Later, quardrate method of biodiversity study was explained by Dr. K Venkataraman. In this method 1mt. x 1mt. quadrates are laid randomly on the site and close observation are made by dividing the study area (1mt X 1mt) in to 4 equal squares. This exercise was found useful for the MCPA managers for understanding the biodiversity and health of the protected areas and such exercise could help in monitoring of the same.

Group-3 Team leader Dr.Y l Prassana, Scientist, Zoological Survey of India, Digha, West Bengal

Field location: Pirotan is one of the 42 islands of Gulf of Kachchh, located near to Jamnagar at $22^0$35.8'-$22^0$36.2' N and $69^0$57.0'-$69^0$57.6'E, having area of 1328.12 ha. The island booned with two major ecosystem i.e. coral reef and mangroves which supports many macro and minor habitats. This island is so named because of the 'Pir' on this island. The island is famous local tourist attraction also. The lighthouse in the island provides remarkable view. The areas has tremendous biodiversity which includes coral reefs species (51 species of corals which consists of 41 hard corals and 10 soft corals), 39 species of sponges, 2 species of hydrozoans & bryozoans each, 1 species of jelly fish, 4 species of sea anemones and zooantharians each, 3 species of flatworm, 4 specie of tubeworms (annelids), 18 species of crabs, 5 species of prawns, 1 species of lobster, 3 species of barnacle, 99 species of gastropods, 47 species of bivalves, 4 species of cephalopods & nudibranch each and 3 species of echinoderms. A peanut worm, bonnelia, is endemic to this locality. Apart from this, around 38 species of avifauana, many fishes, reptiles and dolphins have been recorded.

Objectives

The main objective of the field visit in this training programme was to impart the technical details of biological monitoring through various survey methods to the participants. The familiarization of various live form categories in the reef community as well as physical properties of reef were also planned which will be very helpful in assessing the reef health.

Methodology

The methodology mainly used during biological monitoring exercise was Line Intercept Transect (LIT) and Quadrates.

- **Survey transects/quadrates:** Line transects were laid between the two subsequent quadrates of 10m length. The quadrate observation was taken in sampling size of 10x10m. In each observation, the corals were studied for the species identification, size, form, habitat preference, bleaching, disease etc. The data obtained from the transects and quadrates was further used for the calculation of their density and coverage of dominant species in the particular area or the variation within the nearby area.

Observations

A total three LIT in different zones of reef area were undertaken so that all types of habitats could be covered. These zones were mid-tidal zone, low-tidal zone & reef edge (or sub-tidal zone). The LIT for this exercise purpose were taken of 10m length. However, the quadrates were of size 10x10m were also taken at different zones. The observations mainly recorded during this exercise were live & dead coral cover with their species, habitat characterization, associated flora & fauna, etc.

1. **The survey plan:** Once the participants were familiarized with island topography and reef structure, the survey was planned in such a way so that sample should be taken from each representative area to avoid bias. The transects were planned in mid-tidal region from where live coral distribution starts and followed in low-tidal region and reef edge region. The quadrates were planned subsequently in the same region. This helped the participants to averaged out the data of three sets and interpret the data.

2. **Life form categories**: This exercise was started with characterizing dead and live corals. Only recently dead corals were recorded in Dead category. As the branching corals are absent throughout Gulf of Kachchh, the different life form categories recorded during the exercise were encrusting, digitate, tabular, massive & sub-massive. Most prominently, the corals were either massive or submassive during the entire exercise. Other life forms viz. branching and foliose were also introduced to participants. Non coral life forms observed during the exercise were zoanthids, sponges, algae, etc. The abiotic categories like sand, rubble, silt, water, rock, etc. were also recorded during the exercise. The percentage of different categories recorded during the exercise were as follows:

Category	Percentage
Biotic	
Dead Coral (DC)	5%
Live Coral	17%
Coral Massive (CM)	8%
Coral Submassive (SM)	5%
Coral digatate (CD)	2%
Coral encrusting (CE)	2%
Zoanthids	15%
Sponges	5%
Others	5%
Algae	10%
Abiotic	
Sand	10%
Rubble	8%
Silt	4%
Rock	10%
Water	11%

3. **Coral species** recorded during the survey were *Montipora monasteriata, Goniopora planulata, Porites digitata, Porites compressa, Favia favus, Favia spaciosa, Favites flexuosa, Favites camplanata, Platygyra sinensis* and *Turbinaria crates*. Apart from transects and quadrates, another five species viz. *Siderastrea savignyana, Goniopora minor, Goaniastrea pectinata* and *Platygyra sinensis* were also spotted by the team.

4. **Account of associated flora and fauna:** Apart from survey techniques, the participants with background knowledge and interest spotted various associated fauna and flora during the survey exercise. The fauna recorded outside transects and quadrates also included. The effort was done to describe the cumulative biodiversity assessment data of the location. These were as follows:
   Crabs: *Grapsus alboilineatus*, *Ocypode* sp., *Scylla serrata, Neptunus pelagicus, Mutata* sp., *Charybdis torncata, Portunis longiceps*
   Barnacles: *Balanus amphitrite*
   Sponges: *Jaspis* sp*., Ircinia ramose, Adocia* sp*., Reniera hornelli*
   Hydrozoans: Un identified species.
   Sea anemones: *Stictodactyla gigantean, Metridium* sp.,
   Zoantharians: *Palythoa* sp*., Protopolythoa* sp*., Zoanthus* sp.,
   Polychaete worms: *Protulla* sp., *Sabella* sp.,
   Echinodermata: *Ophiarachna incrassate, Holothuria fascogilva*,
   Gastropods: *Trochus* sp*., Turbo* sp*., Nerita polita, Diodora lima, Tonna cepa, Bursa* sp*., Cymatium* sp*., Natica picta, Telescopium telescopium, Cerithium morus, Cyprea tigris, Crosaria* sp*., Stormbus* sp*., Mitra mitra, Littorina* sp*., Murex* sp*., Thais* sp*., Olivia* sp.
   Bivalve: *Cardium* sp*., Pitar* sp*., Sunetta* sp*., Venus* sp*., Paphia* sp*., Donax incarnates, Solen* sp*., Mactra* sp*., Saccostrea cucullata*
   Cephalopods: *Octopus cyanae, Loligo* sp.

Fishes: *Tetradon* sp*., Arothron* sp*., Trichiurus* sp*., Batrachus* sp.,
Birds: Reef Heron, Egret, Plovers, Oyster catcher, Gull, Terns, Sandpipers
Green algae: *Caulerpa* sp., *Halimeda* sp., *Ulva* sp*., Enteromorpha* sp.,
Red algae: *Dictyota* sp.
Borwn algae: *Padina* sp*., Sargassum* sp*., Gracillaria* sp*., Hypnea* sp.,

Conclusions

The survey exercise undertaken during the training programme at Pirtoan shows that the coral reef at Pirotan consists of about 17% live corals, 5% dead corals and remaining covered with rubbles, sand and reef boulders. Around 10 live hard coral species during the survey exercise and five more while in transit. The most common coral species during the exercise were *Favia, Favites, Porites*, etc. The other dominant reef associated fauna recorded during the exercise were different types of molluscs, crustaceans, cnidarians, etc. and different types of green, brown and red algae. Around 8 species of birds viz. Reef Heron, Egrets, Gulls, etc. also recorded during the exercise which were found feeding in the reef areas.

Day-4 (8th November, 2008)

TECHNICAL SESSION 4

Presentation-I Communication programmes with a view to creating awareness for conserving marine bioresources Shri C H Pandya IFS, Gujarat Ecology Commission, Gandhinagar

Gujarat Ecology Commission (GEC) aims to generate ecological consciousness among the people of Gujarat to develop conservation ethos in the state. GEC provides support to the community based organization for restoration of ecologically degraded areas in the state. GEC has undertaken community based mangrove restoration programme in the state and have restored more than 5000 ha. of mangrove areas. GEC has also developed site specific plantation models and introduced public private partnership models in the state and developed 1000ha. of mangrove areas with the support of industries and community.

GEC has used various interactive processes and used mass media extensively for generating awareness in the community at the local level, at the same time some of these techniques were used for generating awareness of the Taluka, District and State level. The interactive forum used by GEC include Group Discussion, Street Plays, Mangrove/Coral Rally, Mangrove/Coral Mela, Audio-visual shows, Game Shows for School Children/ quiz competition/ photographic competition etc, Poster Presentation, Use of Electronic & Print Media, Exposures to success areas outside and within states and Slogan & Wall paintings etc. It is essential to sustain motivation of the local community by involving them in the strategic planning, effective implementation and monitoring and evaluation. Facilitator has to play this role with great understanding and commitment.

Presentation-II Campaign for Whale Shark Conservation by Mr. Dhiresh Joshi, Wildlife Trust of Iinda, Ahmedabad.

The Wildlife Trust of India (WTI) launched a campaign for whale shark conservation because of the fact that

- Nearly 500 -1200 whale sharks massacred on the coast of Gujarat in 1999-2000.
- There have been reports of young WS pups in the waters of Gujarat, suggesting that whale sharks breed here.
- They were called ‘barrel’ because that is what was used to hunt them down with.
- The liver was used to make cheap waterproofing for boats; the meat had no market in India, but was exported; the meat was sold for 5 cents a kilo (by the fishermen), However, one whale shark of medium dimensions fetched about US$1125 to US$2250 for its liver and meat.

The major challenges faced by WTI were in adequate awareness about whale shark, its existence along the coast of Gujarat and awareness about the protection given under Indian Wildlife (Protection) Act, 1972. The major strategy which was successful used to sensitize people was to use religious and social leader -Morari Bapu, who used the principles of Ahinsa (Non violence), Atithi (Guest is god) and "Beti Maike Aati Hai" (Daughter comes home to give birth) at the emotional level. Street play, procession, celebration of whale shark day, use of local songs and dances were some of the activities under taken by WTI at schools and community level. Government of Gujarat has also recognized this issue and came forward to help conserving whale shark through forest department by providing compensation for releasing the whale shark. Over 72 releases of whale shark has been recorded between 2005-2007. Whale shark conservation campaign was awarded green governance award in November, 2005 by the Prime Minister. WTI plans to Study of the whale shark migration along the coast of India using Satellite Tags, Study of the Whale Shark Habitat and Plankton Bloom using Satellite Imagery, DNA Study and population estimate along the coast of Gujarat, Whale shark Tourism for the long term survival of the species as future activities.

Presentation-III Research on abiotic and biotic components of mangroves and coral reef habitats and its relevance to habitat managers- Dr. Ketan Tatu, Sr. Scientist, GEER Foundation

In this presentation Dr. Tatu covered overview of mangroves and coral reefs, abiotic and biotic components of marine ecosystems, and how to manage coral reefs and mangroves habitats effectively. Mangroves are very rich in biological diversity & complexity and they constitute the second most important ecosystem in productivity after coral reefs. Mangroves in South Asia (including India) play a vital role as nursery ground for many forms of marine life. Similarly, Coral reefs, along with mangrove swamps are highly productive and the centers of high biological productivity having annual production rates ranging from 2000-5000 gC/m3/ year. This high productivity is due to efficient retention and recycling of nutrients within the reef system. They are important nursery ground for fish, crabs and prawns (Potential fish yield from the world coral reefs is 6-9 million tons/year that makes 9-12% of all marine fish catch. Indian Reefs: 0.2 million tons/year (10% of marine fish production - Wafer 1990). Indian reefs have potential yield of 10% of the total marine fish catch.

The major abiotic components affecting coral reef health include, temperature, light, salinity, suspended sediment concentration, nutrients and turbulence. Coral reef need warm clear and relative quite water for optimum growth. Water temperature is most fundamental abiotic factor for corals and organisms associated with corals as it affects all levels of biological organization. The optimum temperature for growth of hermatypic corals and for reef development is 20-28° C. At temperatures below 18-20° C, coral growth becomes limited or ceased and coral bleaching may occur at the temperature above 28° C as Zooxanthellae in coral tissue gets depleted. Similarly impact of water depth salinity, water turbulence and sediments have great impact on the growth and health of coral reefs. The MCPA managers should have the knowledge of all these impacts and they should also be in the position of monitoring these abiotic components and understand the changes and challenges.

Presentation-IV Coral translocation- experience of ESSAR oil ltd., by Mr. Vijay Patel, ESSAR, Jamnagar.

A four phase management plan was drawn by NIO for the protection and conservation of coral ecosystem at the project site of Essar at Nararabet, Vadinar. This included conducted detailed investigation of sub tidal corals along with pipeline and jetty corridors (PHASE- IA), selected new sites for relocation of sub tidal corals (PHASE- IB), assessed and relocated inter tidal corals from the project site (pipeline /jetty) to suitable identified site (PHASE-II), translocation of sub-tidal corals (Pipeline / Jetty) to the identified site (PHASE –III), monitored relocated corals (PHASE – IV A) and undertaken ecological monitoring of the project site during and after completion of Jetty Construction and Pipe laying (PHASE- IV).

Unless we pay special attention to this area we will loose out in environment resources, and the losses will be enormous and mostly irreversible. The world around us as such is full of evidence that natural sites do not look after themselves. Even protected areas are vulnerable to pollution from the increasing pressures of people in our over populated and fragile world. For obvious reasons, coastal zones have become the hub for all industrial activities, and as per the World Bank's statistics: half of the global population will be staying within 60 km's from the coastline by the end of this year. It is in this context, we as a MCPA manager facing challenges which has to be address considering development complementing environment.

Presentation-V Corals and coral reefs of South Asia and conservation issues by Mr. C N Pandey, Director, GEER Foundation, Gandhinagar.

Defining the corals he mentioned that corals represent tiny animals which are colonial cnidarians that secrete an exoskeleton of calcium carbonate while coral reefs are aragonite structures produced by living organisms. Coral reefs are hard substrata formed by organisms such as corals. Coral reefs are estimated to cover 284,300 square kilometers. Southeast Asia accounts for 32.3% of that figure, while the Pacific including Australia accounts for 40.8%. South Asia corals extend from Pakistan to Bangladesh around Maldives, India and Sri Lanka. Restricted along the coast around Bangladesh due to the release of vast quantities of freshwater from the Ganges Rivers.

Interesting facts about Coral Reefs;

- About half of the World's coastlines are in tropics and a third of tropical coastlines are made up with coral reef.
- Coral reef produces limestone at the rate of 400-2000 tons / hectare / year.
- Most biological productive ecosystem of World
- Coral reefs are found in 100 countries, mostly developing countries in tropical region and

forming a backbone of the economy.

- Standing stock of reef fishes have been estimated 160 metric tonnes / km2 in Atlantic and 93 – 239 metric tonnes km2 in Pacific

Later on information on importance and requirements of coral reefs, structure of polyps, food and feeding in corals, reproduction in corals enemies and diseases of corals etc. coral reefs are facing major threats because of human activities leading to global warming, coral mining, pollutions, over fishing and digging of canals etc. He also gave details of impact over corals due to global warming, ocean acidification, over fishing, pollution and mines etc. He gave details of status of coral reefs in South Asia.

Presentation-VI Plant life associated with Coral reef ecosystem by Dr. J R Bhatt, Director, MoEF, GOI.

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Dr. Bhatt began his presentation saying that India is blessed with a variety of coastal ecosystems vital for Socio-economic development. There are 13 coastal ecosystem existing in the country covering 43,763 sq. km. The country has 8,000km's long coastline in 13 maritime States. At present more than 25% of India's population live in coastal areas and 6 million people get employment in fisheries sector (=1.2% GDP), Other economic sectors like tourism, ports, shipping etc. also contributes employment generation. Coral reefs are marvel of nature, ecological wonder & a great gift to mankind. Coral reefs in the sea are like rainforests on the land, they provide shelter, feeding and breeding ground for fishes and other marine creatures. They provide coastal protection, as the sites of tourist attraction, the coral reefs provide a large income, flora associated with coral reefs are important, but least understood for their function. The flora associated with coral reef ecosystem include algae, sea grasses and mangroves

Marine algae constitute an important reef resource in India,

- 844 species under 217 genera.
- Maximum diversity in Gulf of Mannar (302 spp.).
- 202 spp. in Gulf of Kachchh, 159 spp. in Malvan coast, 89 spp. in Lakshadweep & 82 spp. in Goa.
- Seaweeds are used as raw materials for extraction of agar, algin and liquid fertilizers.
- Some algae do cause disease in coral reefs.

Associated seagrass biodiversity in India

- 14 species under 6 genera (36 spp. in the world).
- Maximum diversity in Gulf of Mannar (13 spp.).

- 7 spp. Gulf of Kachchh and Lakshadweep & 9 spp. in Andaman & Nicobar reefs.
- Halophila, Halodue, Enhalus & Cymodocea common in Gulf of Mannar.
- Thalassia & Cymodocea are common in A & N islands.
- Thalassia is common in Lakshadweep, but Enhalus in small patches.

Mangrove Biodiversity

- Of 70 species of global species (FAO, 2007), 40 species are present in India.
- *Rhizophora annamalayana* is endemic to India.
- *Pemphis acidula* is specifically growing in coraline soil especially in Gulf of Mannar.

Legal and policy environment

- Indian Forest Act, 1882.
- Wildlife (Protection) Act, 1972.
- Forest Conservation Act, 1980.
- Environment Protection Act, 1986.
- EIA Notification 1994.
- Biological Diversity Act, 2002.
- Special Acts specific to the states (Karnataka Tree Act, Tamil Nadu Hill Preservation Act).
- Coastal Regulation Zone Notification 1991.
- Ramsar convention on Wetlands.

Ministry of Environment and Forests is providing financial support for implementation of action plan in India at 38 mangrove and 4 coral reef sites.

Future research needs:

- The coastal ecosystems such as coral reefs, seagrasses and mangroves are functionally linked, but their linkages are not understood properly.

- The associated plant life of coral reef ecosystems are known for their biodiversity, but not understood properly for their functions.

- The beneficial and harmful floral components of coral reefs and their ecology need to be analyzed critically.

Presentation-VII Coral & Sea grass restoration feasibility and low cost technology - Dr. J. K. Peterson Edward, Suganthi Devadason Marine Research Institute (SDMRI), Tuticorin, Tamil Nadu.

By analyzing the status of the coral reefs Dr. Patterson Edwards informed that live coral cover is below 40% and many coral species are threaten and endangered. Many reef areas were completely damaged and associated fauna and flora were also affected. The impact of this situation is directly affecting the traditional fisher folk who are totally dependent on fishery resources. The other anthropogenic threats includes seaweed collection, trap fishing, sewage disposal, coastal development (Industries, aquaculture, salt pans etc). In addition, natural threats like cyclone, storms, tsunamis, climate change – coral Bleaching, coral diseases are also affecting corals. In this situation coral restoration is required for following reasons.

- To support natural recruitment process.
- To restore / increase reef cover, particularly in the degraded area – coastal protection & livelihood through fishery production.
- To conserve and enhance threatened / endangered coral species.
- Viable management tool

Coral restoration is suggested as a management tool because it accelerates reef recovery after damage, it bypasses the initial critical stages of natural recruitment and early growth, helps speedy recovery in places where natural recruitment is poor and saves coral communities or locally rare species threatened by pollutions, land reclamation etc. Coral restoration improves reef quality in biomass of live coral cover and enhances the attractiveness of under water habitat in tourism areas. Thus coral restoration enhances fisheries production, coastal defense and recreation which is indirectly reduces pressure on the reefs.

There are six different methods of coral restoration. They are;

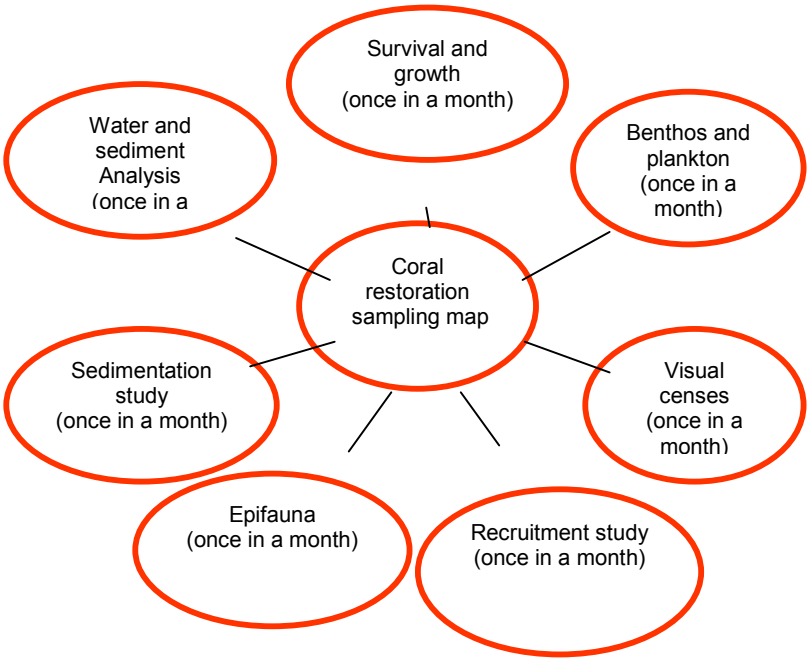
1. Artificial reefs.
2. Electrically stimulated coral growth enhancement.
3. Larval ranching.
4. Relocation of larger coral colonies.
5. Coral fragment re-seeding – transplantation.
6. Community based coral farming.

It is recommended to use native species for coral restoration. The restoration requires material like scuba diving kit, artificial substrates (Concrete frames, cement slabs and locally designed

fish houses), cutting pliers and hammer, nylon rope and Trough, thick cloths and Vernier caliper and well trained professionals to implement the work. The regular monitoring of survival and growth, water analysis, plankton and productivity analysis, sedimentation, benthos, fishes and macro invertebrates, epifauna and natural coral recruitment has to be carried out as shown in schematic diagram.

Sea grasses restoration

Sea grasses play ecological and economic role. As habitat it provides food, shelter and nursery areas and traps sediment and improves water clarity. The rout system binds sediments which helps in coastal protections. Sea grass restoration is done by plugs method, spring (quadrate) method and by sapling method.



Artificial reefs - Natural or man-made external objects or stable structures placed in the sea to attract, aggregate and regenerate pelagic, demersal, migratory and residential fishes. It enhances the fisheries potential in barren or relatively unproductive areas around the world. Artificial reefs have biological functions of reefs that include shelter, feeding, spawning and orientation for fishes. Artificial reefs helps in improving coastal management, provides additional surface area with spaces for higher diversity and abundance of marine organisms, enhances fishery production and attracts ecotourism

Coral and seagrass restoration are essential to rehabilitate the degraded ecologically sensitive habitats to near original status, but they can not replace natural systems.

- Restoration is a supporting process to natural recovery in a localized damaged area.
- Restoration is site specific and viable only on a small scale.
- Preserving threatened / endangered species.
- Well suited for ecotourism, thereby not disturbing the natural reefs and associated habitats.
- Requires much care and standardized techniques.
- Should be conducted in a phased manner.
- Should be conducted in light of global best practices and recommendations – see International Coral Reef Initiative (ICRI) Resolution on rehabilitation and restoration (http://www.icriforum.org/secretariat/pdf/ICRI_resolution_Restoration.pdf).

Presentation-VIII by Shri. Pradeep Khanna, IFS, PCCF(WL)

In the afternoon session, The PCCF, wildlife, Shri P. Khanna facilitated an interactive session on management of coastal areas. With innovative methods he made all the trainees think about issues in their countries. He then grouped these issues and explained how these issues can be tackled using various knowledge sourcing methods.

The main issues were: ecological and nature related Peoples participation and livelihoods Threats to coastal areas Knowledge gaps Research and Monitoring Law and Enforcement. The PCCF also showed the participants how the issues were linked and how solving one problem can lead to alleviating the condition caused by another problem. Then he explained that the main key to good management was finding the main problem in the area and then looking to solve the problem given the finite manpower and financial resources available to the coastal managers. This was followed by discussion on the issues by the participants.

The flow of action to be carried out by the MCPA managers as discussed in this session came out as :

- Identify problems and concerns for coastal management and their global and local relevance;
- Find out relationships of these issues with local people and rank your priorities;
- Address the issues, list the gaps in information;
- Fill in the gaps;
- Frame Action Plans.

After this session all the participants spoke of the system of coastal management in their country. The participants from Sri Lanka highlighted their experience in getting glass bottom boat owners to restrict the number of boats voluntarily in the Hikkaduwa marine park. The Maldive participants informed the house that the dive operators as coral reef

could be used for monitoring the health of coral reefs, since a clean and healthy reef is essential for the operators to get their livelihood. The Gulf of Mannar managers identified the immense load of silt, pollutants and temperature deviations in coral areas due to industrial effluents and they envisaged the need of generating awareness and involving local people in the management of the marine eco-system.

Panel Discussion

At the end of the Workshop a panel discussion was organize under the chairmanship of Shri. Pradeep Khanna, IFS, PCCF(WL), Gujarat State. The other members of the panel discussion were Dr. J R Bhatt, Director, MoEF, and Shri C N Pandey, IFS, Director, GEER Foundation, Gandhinagar. The main points discussed in the panel discussion are briefly presented here.

There can be an inter-country student exchange programme. By such programme science (of coral / mangrove etc.) will keep on prospering in South Asia despite the administrative / political differences among the South Asia Countries.

There is a need of starting a magazine / newsletter by involving SACEP and all the participating countries of MCPA programme. The proposed newsletter may publish small success stories, notes, news on initiative taken by one on the other country. News items etc. with respect to the Marine and Costal Protected Areas. This will help the manager of the respective countries in knowing about what's going on in other countries of South Asia with respect to Marine and Costal Protected Areas, Coral reefs, Mangroves, Marine life etc.

The four day training workshop on MCPA from 05-08, November, 2008 in just a beginning. There could be more such programmes. At least one such programme can be arranged once every year with the help of SACEP, Ministry of Environment of respective countries and organizations like GEER Foundation.

The local communities of the area and boatman have rich knowledge of biodiversity which should be documented and disseminated.

Maldives has developed tourism in a mind boggling manner. However, Andamans also have great capacity for developing such tourism. In fact, Andaman in the only area having tourism potential, where the vast sea and high mountains exist side-by-side here. The mountain chain runs very close to sea shore. Moreover, Andaman not only has potential for sea based tourism, but also has potential for forest based (Terrestrial) tourism. However, Andaman is under the control of Central Government of India. Therefore, it is required that the Central Government Authorities consider Andaman's Tourism potential seriously and do the needful for its development.

The material supplied by organizer on marine and coral diversity was very useful however it should be made available to the local staff and local communities. Book on frequently asked 101 questions on coral by Dr. Wafar was very informative and useful. SACEP can produce such informative communications and circulate to the member countries and the member countries could translate such information in local languages.

Coral conservation is a complicated issue. Conservation of coral despite the administrative boundaries is a challenging task. This 4 day workshop was a new beginning for some and for other it was a continuing experience. This experience will go in long was and will help in challenging task of coral conservation. SACEP should identify trans-boundary issues and take it up at SA level for consensus and actions.

Regular exchange information and skill building are two areas where SACEP has to play a key role in generating awareness and enhancing the efficiency in overall management of marine and coastal areas.

Evaluation of the training by participants.

By and large, the delegates were happy about the content of the workshop and the kind of resource persons invited for the workshop. They also thanked organizers for taking personal care and created an environment conducive for learning. However, they had suggested following changes in the training workshop in future.

Lecture on coral reef / coral biology by Mr. C N Pandey, Director, GEER Foundation could be arranged on the first day as it was very important a basic lecture on coral. Moreover, interactive 'Game' by Shri. Pradeep Khanna could be kept on the first / second day. That could help the delegates in tuning themselves very thoroughly for rest of the day of the workshop with respect to the subject matter. On the whole, the workshop was excellent.

It was some what hectic schedule for the foreign delegates. There could be more days for the workshop so that the foreign delegates could be at ease.

However, this workshop was very good and useful. At the end of training workshop the delegates were distributed certificates and mementos by Shri. Pradeep Khanna, PCCF (WL), Gujarat State.

Recommendations

- Detailed project development workshop (within three months).Technical experts who will implement each component activity to be invited for project preparation from each SA country. It may be desirable to invite group of 5-10 experts from each SA country and the venue of workshop may be any SA country.
- It was agreed to identify a strategy to advance discussions on the sustainable financing for initial two years (Phase I) to be decided in next workshop. Depending upon the progress and outcome of Phase I, subsequent project milestones to be developed.
- Representatives suggested the most suitable way to remain in communication and coordination is through the SACEP.

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Annexure-II

Schedule for the proposed MCPA Managers Exchange Programme 5th November 2008 to 8th November 2008, GEER Foundation, Gandhinagar

Day-1 (5th November, 2008)

0900 hrs to 1000 hrs	Inauguration	
1000 hrs to 1015 hrs	Tea break	
	Technical Session - I	
1015 hrs to 1045 hrs	Introduction of SACEP activities and training workshop objectives- **Dr. A Boaz**	
1045 hrs to 1130 hrs	Corals and coral reefs of South Asia and conservation issues- **Mr. C. N. Pandey**	
1130 hrs to 1145 hrs	Discussions	
1145 hrs to 1215 hrs	Experience sharing and presentation by participating country	
	Bangladesh- 30 minutes	
	Presentations – 20 minutes	Discussion – 10 minutes
12.15 hrs to 12.45	**India- 30 minutes**	
	Presentations – 20 minutes	Discussion – 10 minutes
12.45 to 13.15 hrs	**Maldives - 30 minutes**	
	Presentations – 20 minutes	Discussion – 10 minutes
13.15 to 14.00 hrs	Lunch	
	Technical Session - II	
14.00 hrs to 14.30 hrs	**Pakistan - 30 minutes**	
	Presentations – 20 minutes	Discussion – 10 minutes
14.30 to 15.00 hrs	**Sri Lanka** - **30 minutes**	
	Presentations – 20 minutes	Discussion – 10 minutes
15.00 to 15.15 hrs	Tea	
15.15 to 16.00 hrs	Coral reefs of South Asia and remote sensing methods used in monitoring of coral reef health - **Dr. Anjali Bahuguna, SAC, Ahmedabad**	
16.00 hrs to 17.00 hrs	Visit to Fossil Park	
17. 00 hrs	Departure for Jamnagar	
21.00 hrs	Dinner at Limbdi	
2300 hrs	Arrival and night halt at Jamnagar	

Day-2 (6th November, 2008)

	Technical Session – III
0900 hrs to 0945 hrs	Biodiversity of coral reefs in South Asia- **Dr. M. Wafar, NIO**
0945 hrs to 1000 hrs	Discussions
1000 hrs to 1030 hrs	Community dependence on reefs and institutionalizing community participation- **Dr. Hemal Kanvinde, CARESS**
1030 hrs to 1045 hrs	Discussions
1045 hrs to 1100 hrs	Tea break
	Technical Session – IV
1100 hrs to 1145 hrs	Relevance of conserving marine and coastal bioresources in South Asia- perception of threats and major management issues- **Dr. Venkataraman**
1145 hrs to 1200 hrs	Discussions
1200 hrs to 1245 hrs	Plants life associated with coral reef ecosystem- **Dr. J. R. Bhatt**

1245 hrs to 1300 hrs	Discussions
1300 hrs to 1400 hrs	Lunch
1400 hrs to 1900 hrs	Introduction of Marine National Park, Jamnagar and visit to Narara mangrove plantations & coral reefs - **Mr. D. S. Narve**

Day-3 (7th November, 2008)

Visit to mangrove and coral reef areas at Pirotan Island

Field exercises

Lunch at Pirotan

Group discussions at Pirotan

Country wise discussions regarding legal framework, implementation infrastructure, monitoring and control of marine pollution, mass communication methods, major management issues etc.

- **CF, Marine National Park & Sanctuary**

Return to Jamnagar in the evening

Dinner at Jamnagar

Day-4 (8th November, 2008)

0900 hrs to 0930 hrs	Communication programmes with a view to creating awareness for conserving marine bioresources- **Shri C H Pandya IFS, GEC, Gandhinagar**
0930 hrs to 1000 hrs	Communication programmes with a view to creating awareness for conserving marine bioresources **Mr. Dhiresh Joshi, WTI**
1000 hrs to 1015 hrs	Tea
1015 hrs to 1100 hrs	Research on mangroves and corals by GEER Foundation and the role of research in the management of mangroves- **C N Pandey, Director, GEER Foundation**
1100 hrs to 1145 hrs	Research on abiotic and biotic components of mangroves and coral reef habitats and its relevance to habitat managers- **Dr. Ketan Tatu, Sr. Scientist, GEER Foundation**
1145 hrs to 1230 hrs	Management of Marine National Park and Sanctuary, Jamnagar- **Mr. Pradeep Khanna**
1230 hrs to 1245 hrs	Discussions
1245 hrs to 1315 hrs	Group discussions
1315 hrs to 1400 hrs	Presentations by all the groups and consolidation of ideas
1400 hrs to 1445 hrs	Lunch
1445 hrs to 1530 hrs	Coral & Sea grass restoration feasibility and low cost technology- **Dr. J. K. Peterson Edward**
1530 hrs to 1600 hrs	Panel discussion on preparing a management action plan for MPA- technical, legal and administrative issues
1600 hrs to 1630 hrs economic issues	Panel discussion on preparing a management action plan for MPA-socio-
1630 hrs to 1645hrs	Tea
1645 hrs to 1715 hrs	Feedback, summing up and valedictory
1715 hrs to 2100 hrs Jamnagar	Free evening at Jamnagar, optional visit to Khijadiya Bird Sanctuary near **- Dr. Ketan Tatu, Sr. Scientist, GEER Foundation**

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