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IHE/WMS/Rep.  
15 March 1994

ENGLISH ONLY

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

REPORT OF THE ESCAP/UNEP/SACEP WORKSHOP ON MANAGEMENT  
STRATEGIES FOR THE PROTECTION OF THE COASTAL AND  
MARINE ENVIRONMENT IN THE SOUTH ASIAN SEAS REGION

Colombo, 20-23 December 1993



## **I. ORGANIZATION OF THE WORKSHOP**

1. The ESCAP/UNEP/SACEP Workshop on Management Strategies for the Protection of the Coastal and Marine Environment in the South Asian Seas Region was held in Colombo from 20 to 23 December 1993.

### **A. Attendance**

2. The Workshop was attended by representatives of all the marine States of the South Asian seas region, Bangladesh, India, Maldives, Pakistan and Sri Lanka. There were observers from the Intergovernmental Oceanographic Commission (IOC), the World Wide Fund for Nature (WWF), the United Nations Development Programme (UNDP), the World Bank and the Asian Development Bank (ADB). Mr B.H.Nielsen, consultant to ESCAP, and Professor Jiayi Zhou, Chairman of the Regional Working Group on Marine Environment and Oceanographic Studies, acted as resource persons. The list of participants is given in annex I to the present report.

### **B. Opening of the Workshop**

3. HE Mr S.M. Chowdhury, High Commissioner, Bangladesh High Commission, Sri Lanka, and Chairman of the Consultative Committee of the South Asian Cooperative Environment Programme (SACEP), welcomed the participants. He illustrated the role of SACEP in the environmental activities in the South Asian region. He also emphasized that assessment exercises focusing on environmental topics, such as the current Workshop, and the development of environmental management instruments should be backed by a clear commitment by Governments. That was essential to assure effective implementation of research findings and proposed plans.

4. The Workshop was opened by Hon Dr Wimal Wickremasinghe, Minister of Environment and Parliamentary Affairs, Government of Sri Lanka. In his address, he highlighted the role of coastal zone management as a fundamental tool for achieving development objectives within a sustainable planning framework. He also expressed the continuous commitment of the Government of Sri Lanka to develop a planning system to deal with the complex problems of the coastal areas in the country.

5. The Chief of the Environment Section of ESCAP welcomed the participants. The Director of SACEP proposed a vote of thanks.

### **C. Election of officers**

6. Mr Hussain Shihab (Maldives) was elected Chairman, Mr Risalat Ahmed (Bangladesh) and Mr J.V.R. Prasada Rao (India), were elected Vice-Chairmen, and Mr S.H. Niaz Rizvi (Pakistan) and Mr B.S. Kahawita (Sri Lanka) Rapporteurs.

### **D. Adoption of the agenda**

7. The following agenda for the Workshop drawn up by the secretariat was adopted.

1. Opening of the Workshop.
2. Election of officers.
3. Adoption of the agenda.
4. Overviews of the marine/coastal environment of the South Asian seas region.
5. Available reports, existing facilities, experiences and institutions on coastal environment management and planning in the South Asian seas region.
6. Country reports on coastal environment management: Bangladesh, India, Maldives, Pakistan and Sri Lanka.
7. Capacity-building requirements and priority actions in the field of planning and management of coastal areas in the South Asian seas region.
8. Regional Working Group on Marine Environment and Oceanographic Studies.
9. Recommendations.
10. Adoption of the report.

## **II. OVERVIEWS OF THE MARINE/COASTAL ENVIRONMENT OF THE SOUTH ASIAN SEAS REGION**

(Item 4 of the agenda)

3. The Chief of the Environment Section of ESCAP presented an overview of the coastal environmental management issues in the South Asian countries. He described the experience gained by ESCAP in the preparation of coastal environmental management plans in the South Asian region and in the development of planning and management methodologies for coastal and marine areas. He emphasized that integrated coastal zone management was an iterative approach that called for sustained effort and institutional support. Localized action, adaptive management, negotiation, consultation, and coordination of planning procedures were key elements in the evolution of the planning instruments. The major objective of the current project was to promote improved management and planning capabilities within the Governments of the region. Background studies and national reports had been prepared to facilitate the identification of capacity-building requirements in each country and opportunities to address priority areas through regional cooperation activities.

9. The Workshop was expected to produce tangible results in the form of capacity-building projects and programmes, to be implemented in close linkage with the national planning systems and through substantial mobilization of the resources available within the region. The analysis and proposals produced by the Workshop would be submitted to an intergovernmental meeting to be convened at a later stage for endorsement by the Governments of the participating countries.

10. Mr V.P. Jauhari, Director of SACEP, gave an overview presentation on the background of the UNEP South Asian Seas Regional Programme. He reviewed the historical development of that Programme and the objectives of the South Asian Seas Action Plan, approved by the national environmental focal points of the participating countries in 1987. He reported on the status of implementation of the six priority projects carried out in anticipation of the formal adoption of the Action Plan by the Governments. He underlined the coordinating role played by SACEP in such undertakings and the need to strengthen the institutional links to ensure full cooperation among participating States in the implementation of the regional programme. SACEP should play the central role in the management of the programme, through the support and contribution of member Governments and with the assistance of United Nations and other international organizations.

11. Dr B.R. Subramaniam, representing also the Intergovernmental Oceanographic Commission, briefed the meeting about current activities implemented by IOC and stated its willingness to collaborate in cooperation activities for capacity-building.

12. At the invitation of the Chairman, Mr M. Ali briefed the Workshop about the findings of the UNEP Preliminary Meeting of Experts to Assess the Effectiveness of the Regional Seas Agreements, held in Nairobi from 6 to 10 December 1993 and, in addition, the progress of the South Asian Seas Programme.

### **III. AVAILABLE REPORTS, EXISTING FACILITIES, EXPERIENCES AND INSTITUTIONS ON COASTAL ENVIRONMENTAL MANAGEMENT AND PLANNING IN THE SOUTH ASIAN SEAS REGION**

(Item 5 of the agenda)

13. Mr Bent H. Nielsen presented the discussion paper entitled "Existing capacities for dealing with coastal environmental management and planning". The document reviewed the statutory instruments and planning measures developed in the five countries for coastal environmental management. The review included: Bangladesh - Coastal Environmental Management Plan for Bangladesh, 1988; Feasibility Study: Integrated Coastal Zone Management for Bangladesh, 1993; Maldives - Environment Action Plan, 1989; India - Notification F. No. 1811/5/87-HSMD on Coastal Regulation Zones issued by the Ministry of Environment and Forests, 1991; Pakistan - Coastal Environmental Management Plan for Pakistan, 1993 (draft); Karachi Coastal Recreation Development Plan 1990-2000; Sri Lanka - Coastal Environmental Management Plan for the West Coast of Sri Lanka: Preliminary Survey and Interim Action Plan 1988; Coastal Zone Management Plan, 1990; Coastal 2000 - A Resource Management Strategy for Sri Lanka's Coastal Region 1988; and ESCAP - Draft Guidelines for Coastal Zone Planning and Management, 1993.

14. The representatives of Sri Lanka recommended the inclusion of the Coastal Erosion Management Master Plan in the updated version of the document. The secretariat invited the country representatives to make available additional information to be integrated into the background document. The Workshop noted that, under the implementation of international agreements such as the Convention on Wetlands of International Importance Especially as Waterfowl Habitat, of 1971 (Ramsar Convention), management guidelines had been produced that might provide useful technical inputs.

#### **IV. COUNTRY REPORTS ON COASTAL ENVIRONMENT MANAGEMENT**

(Item 6 of the agenda)

15. The authors of the country reports presented their findings to the Workshop. The national reports were circulated in draft form. The studies were prepared following common terms of reference and guidance provided by the ESCAP secretariat. The reports are to be reviewed and finalized based on the guidance provided and suggestions made at the Workshop.

##### **India**

16. Mr J.V. R. Prasada Rao presented the national report for India. He stated that 12 States and Union Territories shared the 7,516.6 km of national coastline. That extensive coastline was endowed with important natural resources; the 60 coastal districts were inhabited by 154 million people, corresponding to 18.2 per cent of the population of India. The coastal area possessed enormous diversity in terms of culture, economic development and availability of infrastructure. While agriculture and fisheries continued to be the major economic activities, a number of major industrial complexes and transport infrastructures were located in the coastal areas and had a significant impact on the regional and national economy. Therefore population growth and development pressures had a varying impact on natural resources and coastal ecosystems.

17. The management of the marine environment came under the Territorial Waters, Continental Shelf, Exclusive Economic Zone and Other Maritime Zones Act of 1976; India was also a signatory of a number of international conventions, including the Convention on the Law of the Sea of 1982. In 1991, the Ministry of Environment and Forests had issued a notification under the Environment (Protection) Act 1986, requesting coastal States to produce coastal zone management plans, based on guidelines included in the notification. It had also constituted a task force to review the plans. Further management instruments for threatened ecosystems were being developed in pursuance of the National Conservation Strategy issued in 1992. Environmental impact assessment requirements might also affect coastal area planning.

18. The formulation and implementation of coastal zone management plans were affected by different social, cultural, economic and institutional factors in each State. The State and local administrative structure in the country had to be fully geared up to meet the challenges of managing coastal zones considering the multiple users and development pressure. As the district was the basic planning unit, institutional mechanisms should be strengthened particularly at that level, through the development of coordinating mechanisms and within the framework of state and national plans. The State Government of Andhra Pradesh was the first to establish, in 1985, a Shore Development Authority with a clear mandate for coastal zone management.

19. Technological development was a key factor in ensuring sustainable development: a wide range of technology development and research programmes was available in the country, including desalination technology, remote sensing, land and water resource management, ocean resource management, forestry and mineral resource management, shore-to-vessel communication systems, ocean energy and biotechnology.

20. Major capacity-building requirements included the following: land and coastline mapping, marine environmental data exchange networks, monitoring and modelling of sea-level variations, natural resource and impact assessment survey in the coastline and in the territorial sea, research vessels for nearshore waters, upgrading contingency planning capabilities to deal with oil pollution, introduction of coastal zone management in the curricula of existing training institutions, upgrading and international linkage of the national ocean information system and environmental information system, and support for participation in international scientific programmes.

### **Pakistan**

21. Mr S. H. Niaz Rizvi presented the national report for Pakistan. The country had a coastline of about 900 km, shared by the State of Sindh and Baluchistan and mostly inhabited. Karachi was the only developed and the most industrialized coastal city, presenting problems for waste disposal control and land-use conflicts. Fisheries, mangroves, minerals, seaweed, salt, oil and gas were the major natural resources. The coastline had high potential for the development of infrastructure to support transport, fishing activities, power production, industrial production, mariculture, tourism and housing. However, poor socio-economic conditions and environmental degradation were widespread. Local community participation was still very limited in current planning practices, especially in underdeveloped areas under traditional power structures.

22. A Coastal Environmental Management Plan had been prepared for the entire coastline with the support of ESCAP. However, no legislative framework existed for the formulation of planning instruments for coastal areas; provincial governments would be responsible for coastal area management under the existing planning system. A large number of central and provincial agencies had sectoral planning responsibilities. While ongoing planning efforts dealt mainly with mangrove and

fisheries management, implementing agencies were inadequately equipped to enforce the laws and take preventive measures. In Karachi, a Coastal Recreational Management Plan was being developed, based on an integrated approach and the identification of options for the solution of resource utilization conflicts in urban areas. The International Union for the Conservation of Nature and Natural Resources (IUCN) and the World Bank were supporting a major reforestation project in the Hindus delta.

23. Small coastal communities and coastal towns should be involved in development programmes to broaden the economic base, to enhance fishing skills and boat-building skills, to introduce low-cost and appropriate fishing technologies, to promote alternative energy sources for domestic sea-water desalinization and improved fish preservation, and to provide adequate sanitation.

24. Major capacity-building requirements related to marine resource mapping and monitoring, fragile ecosystem management and technical expertise in fields such as environmental impact assessment, coastal engineering, environmental protection, fisheries resource management, pollution control, coastal zone planning, coastal protection, navigational aid along the coastline in Baluchistan, socio-economic training and development of rural communities in Baluchistan, as well as support to traditional boat construction practices.

#### **Maldives**

25. Mr Hussain Shihab presented the national report for Maldives. The coastal resources of the islands had been severely exploited by the rapid growth of the tourism sector and the related development of infrastructure, waste dumping and coral-mining. The local population was also experiencing very rapid growth, at the rate of 3.4 per cent between 1985 and 1990. Fishing had traditionally been the main source of income, but had now been superceded by tourism; limited alternatives were available, such as garment production and trade activities. The deficit of skilled and semi-skilled labour was a major feature.

26. Obviously costal zone management meant environmental management in the widest terms for that island country. The overall responsibility lay with the Ministry of Planning, Human Resources and Environment. Inter-agency coordination was achieved through the National Commission for the Protection of the Environment. A comprehensive National Environmental Action Plan had been formulated in 1989, but its implementation had been hampered by the lack of adequate funding. Statutory instruments included the Environmental Protection and Conservation Act 1993, opening the way for the formulation and implementation of guidelines for environmental impact assessment and the control of coral-mining. Sectoral regulatory instruments were available for fishing activities, housing development and logging. A major factor limiting the enforcing capability of national agencies was the shortage of trained manpower. Manpower development plans had been prepared for various government agencies.



27. Key development issues to be addressed included the encouragement of activities requiring minimal use of freshwater and energy, the promotion of food self-sufficiency through sustainable practices such as increased use of reef fish, provision of land for the construction of concrete building blocks, population control policies and discouragement of migration flows to Male. Past studies and research had enabled the country to focus development objectives to overcome fragmented attempts.

28. The first development constraint to be addressed was human resources development. Upgrading of technical skills had been achieved by sending people overseas for training; training opportunities within the region had been used only to a limited extent. Priorities for capacity-building included the development of capability for integrated coastal zone management and land-use planning, coastal protection, the assessment of biological diversity, the protection and monitoring of marine ecosystems, the setting up of a system of protected areas and the assessment of coral damage in tourist islands.

### **Bangladesh**

29. Mr R. Ahmed presented the country report for Bangladesh, as the national consultant was unable to attend the Workshop. The coastal areas of Bangladesh included a complex delta system and a variety of ecosystems. Traditional patterns of natural resource exploitation dominated economic activities. Eighteen million people lived in the coastal areas, which were often highly vulnerable to natural disasters.

30. Administrative boundaries were based on 12 coastal districts. The planning system was weak and highly centralized. Planning was not a mandatory exercise, as planning institutions had been created by administrative decisions. Land-use planning did not exist. Development initiatives mainly supported the government sector and focused on infrastructure development, rather than capacity-building, sanitation etc. People participation in planning was virtually absent.

31. Data availability was limited, especially for remote coastal areas. The preparation of a computerized database of natural resources would be a priority so as to build effective planning capability. However, the paucity of data available should not obstruct the attempt to develop management plans. In 1992, the Government had formulated the Concept Plan for Integrated Coastal Protection; the Integrated Coastal Zone Management Strategy had been produced in 1993. It included recommendations for the formulation of public policies, the establishment of inter-agency coordination mechanisms, the development of planning instruments based on land suitability analysis and the implementation of pilot studies at the local level.

32. The World Bank had supported a major mangrove reforestation project and the country was trying to develop a green belt along the coast based on such experience. Studies were being carried out under the Flood Action Plan; those could be reviewed by the Minister of Environment to ensure

that due consideration was given to the environmental aspects. During the formulation of the Plan, a considerable amount of data had been produced and consultations with local people carried out. While predictive capacity for storm surges was being upgraded by the Department of Meteorology, the lack of infrastructures and resources for evacuation limited the effectiveness of planning measures for natural disasters.

### **Sri Lanka**

33. Mr B.S. Kahawita, Director of the Coast Conservation Department, illustrated the historical development, current structure and ongoing revision process of the coast management planning system in Sri Lanka. The key step was the formulation of the Coast Conservation Act, 1981 and the establishment of the Coast Conservation Department. The Department had primary responsibility in the designated coastal zone for policy formulation, planning and research; administration of planning procedures regulating coastal development activities, and the construction and maintenance of shoreline protection works. Inter-agency coordination was ensured through the Coast Conservation Advisory Council and frequent and informal inter-agency discussions. The first Coastal Zone Management Plan had been prepared in 1990. The Plan addressed shoreline erosion, loss and degradation of natural habitats, and loss and degradation of historic, cultural, recreational and scenic sites. The Plan was complemented by the Coast Erosion Management Master Plan and was currently under revision.

34. A broader revision of coastal zone management objectives and practices had been carried out in the report "Coastal 2000", approved by the Cabinet. The report suggested changes such as: a more comprehensive approach not limited to single agency and sectoral approaches to coastal resource problems; a revision of the emphasis given to regulation; integrated strategies for water quality management, habitat degradation, natural resource use by people and institutional weaknesses; broadening the geographic definition of the coastal zone; and participation by local and provincial officials and coastal communities in the formulation of plans and strategies.

35. Dr J. Samarakoon presented a case-study on the formulation and implementation of the Muthurajawela - Negombo Lagoon Master Plan. The Plan had been initiated following a President's order and subsequently approved by the Cabinet. It consisted of four management instruments based on a precise zoning strategy that took into account the need for a precise geographic demarcation of land uses. The implementation of the Plan was proceeding under the supervision of a steering committee chaired by the Minister of Policy Planning and Implementation, and involved extensive community-level activities. The experience gained from the Plan stressed the importance of broadening the geographic boundaries and scope of planning; and the empowerment of all stakeholders through suitable participatory mechanisms and development strategies.

36. Dr J. Samarakoon presented the national report for Sri Lanka containing a critical analysis of the lessons learned from the implementation of the national planning systems and the special area management planning system. Under past and current technical assistance programmes, Sri Lanka had benefited from continuous support in the field of coastal zone management, including erosion management, policy development and human resources development. The experience gained and lessons learned could be shared in regional cooperation activities. Major capacity-building requirements included the development of tertiary-level curricula in integrated coastal zone management and monitoring capability for water pollution control.

**V. CAPACITY-BUILDING REQUIREMENTS AND PRIORITY ACTIONS IN THE  
FIELD OF PLANNING AND MANAGEMENT OF COASTAL AREAS  
IN THE SOUTH ASIAN SEAS REGION**

(Item 7 of the agenda)

37. Mr B.H. Nielsen introduced the document entitled "Analysis of capacity-building requirements and priority action at the regional level". The document presented an analysis of capabilities and some capacity-building requirements in the countries of the region, based on a fact-finding mission carried out by ESCAP and a critical review of available information. The document attempted to identify a regional strategy for capacity-building in coastal zone management, consisting of a set of pilot management plans to be prepared for selected coastal areas and an "umbrella project" for regional cooperation. The proposed action plan would require a common framework of action, external assistance as well as the mobilization of capabilities and resources available within the region. Further potential areas were also proposed for regional cooperation in the field of ocean management.

38. The secretariat requested the participants to comment on the analysis and proposed strategy presented in the document as well as the information provided through the national reports. The Workshop noted that, in order to ensure support and effective implementation of the proposed projects, those should focus on development objectives.

39. The representatives of the Asian Development Bank (ADB) and the World Bank mentioned that, while regional funding was supported by their organizations, priority was given to national programmes. The Governments should express their clear commitment to the proposed initiatives and identify their own resources and gaps. Requests for technical or financial assistance should be accompanied by mobilization of national resources.

40. The Workshop recommended that the analysis of capacity-building requirements should be integrated into the information provided through the national reports. Capacity-building initiatives should be formulated based on the identification of suitable institutions existing in the region.

41. The participants wished to know the status of new and additional resources which it had been promised at the United Nations Conference on Environment and Development would be made available for sustainable development efforts.

42. The Workshop analysed requirements, priorities and options for capacity-building in two parallel working groups, dealing respectively with coastal zone management and ocean resource management. The working groups were requested to base their recommendations on the documentation presented at the Workshop and in the overall context of Agenda 21, Capacity 21 (of UNDP) and the recommendations of the World Coast Conference held in 1993.

43. Each working group elaborated a set of recommendations that were presented at a plenary session. The plenary session reviewed and produced a consolidated set of recommendations as shown below.

44. Among the capacity-building requirements listed in the recommendations, the Workshop identified the following project areas for priority action:

- (1) An umbrella project for regional cooperation and pilot projects in integrated coastal zone management;
- (2) Development and implementation of national and regional oil spill contingency planning;
- (3) Human resources development through the strengthening of national centres of excellence.

45. The recommendations included suggested criteria for the development of such project ideas.

## **VI. REGIONAL WORKING GROUP ON MARINE ENVIRONMENT AND OCEANOGRAPHIC STUDIES**

(Item 8 of the agenda)

46. Professor J. Zhou introduced information paper ESCAP/COAST/SAS/WD.12, consisting of the report of the first meeting of the Regional Working Group on Marine Environment and Oceanographic Studies, held in 1992. He referred to the terms of reference of the Regional Working Group and the selected priorities for action. He requested the representatives of the countries to support the planned activities of the Working Group and to submit basic inputs to help in identifying priority areas to be addressed within the region in the fields of marine environmental monitoring techniques, including marine pollution and oceanographic parameters, and environmental assessment methodologies.

## VII. RECOMMENDATIONS

(Item 9 of the agenda)

47. The Workshop made the following recommendations.

### A. Regional coordination

(1) It was recommended that SACEP should be the regional coordinating agency for the identified tasks and in particular the "umbrella project" coordinating the national pilot projects described under section B below, and for implementing the projects of a regional nature through the national focal points.

### B. Integrated coastal zone management

(2) With a view to facilitating the formulation of national programmes in integrated coastal zone management, a pilot project should be undertaken in each country according to the following criteria. The regional project should be identified and prepared by SACEP and pilot projects might be prepared by the national focal points.

- (i) Identification of an institutional arrangement for coordination and oversight of the development, monitoring and implementation of the project.
- (ii) The Ministry of Environment or such other Ministry to be identified by the national Government might play the coordinating role in each country, if an agency in charge of coastal zone management did not already exist.
- (iii) The programme should build on existing structures, including legislative, institutional, technical, administrative and financial resources in the countries of the region, and should be undertaken as part of the national development planning process.
- (iv) Where necessary the United Nations Environment Programme (UNEP), ESCAP and SACEP might facilitate the flow of technical expertise, transfer of technology, information exchange and other mechanisms for the implementation of the projects, with a view to facilitating the formulation of national integrated coastal zone management.
- (v) The overall objective of the integrated coastal zone management projects was to augment and improve the livelihood potential of coastal areas to minimize resource-use conflicts. Those projects might be formulated using a participatory approach, where all local communities, grass-roots-level non-governmental organizations (NGOs), local associations and other relevant organizations should be involved actively in planning and implementation.

- (vi) In implementing the projects, capacity-building would be required in the areas of: legislation; institutional development; preparation of a database and information exchange programmes; appropriate technologies for the development of coastal resources of coastal resource exploration, utilization and conservation; disaster mitigation; environmental impact assessment; management of coastal ecosystems; erosion management and monitoring of the sea level; and appropriate information systems for planning and management.
- (vii) SACEP should assist in providing technical expertise wherever necessary for the further identification of such requirements.

### **C. Regional capacity-building requirements**

#### *Ocean resource assessment*

- (3) The capability and capacity in the region for ocean resource assessment should be enhanced by acquiring and augmenting the expertise and infrastructure.
  - (i) The capacity of research vessels available in the member countries in the region should be assessed for developing capacity-building for ocean resource mapping.
  - (ii) The capacity for remote sensing for fisheries resource assessment and exploitation in the region should be developed through bilateral/multilateral arrangements. The requirements of validity, collection and storage of data and their direct use should be developed for the effective use of remote sensing techniques.
  - (iii) Capacity should be built up for oceanographic data collection, particularly for information monitoring and forecasting through ocean data buoys (moored/drifted) for the specific oceanographic parameters.
  - (iv) The capacity for the exploration of non-living resources, particularly the placer minerals, sand deposits and oil and gas deposits, could be developed in the region.
  - (v) The technology for renewable sources of ocean energy, such as wave energy, wind energy, ocean thermal energy conversion and tidal energy, should be developed where applicable.

#### *Data and information system*

- (4) The capacity-building for data collection, storage and information needed to be developed in each country at relevant data centres. The nodal institutions for that purpose should be identified in each country to act as national and regional data centres. The countries without mechanisms for data collection or any effective data collection system needed to strengthen their capacity for data collection and information systems, as well as for regional data networking. The details for the collection,

storage and retrieval of data brought out in a common format should be worked out at a meeting of national experts in the region.

*Marine pollution*

(5) The capabilities in the region for the monitoring, assessment and prevention of marine pollution, from both land-based and sea-based sources, including dumping and oil spill response, should be developed.

(a) *Pollution from land-based sources*

- (i) Capabilities for the monitoring, assessment and prevention of pollution from land-based sources in coastal waters and in the "hot spot" areas should be developed and enhanced where applicable.
- (ii) Nodal institutions for addressing marine pollution problems should be identified in each member country.

(b) *Oil pollution*

(6) The capabilities for oil spill emergency response should be developed, focusing particularly on the following:

- (i) Baseline data on oil pollution in the critical areas: the capacity for baseline data collection for oil pollution along the oil tanker routes needed to be developed.
- (ii) Combating oil spills: as the region fell in the high-risk area for oil pollution and had inadequate oil spill response capabilities, a regional oil spill contingency plan should be prepared and updated for its application in the region. Existing oil spill response capabilities in the region should be inventoried and augmented. The capacities in nearby areas outside the region might also be inventoried and made available through regional arrangements.
- (iii) The legislation and mechanisms for filing oil pollution damage claims needed to be developed wherever applicable in the region.

*State-of-the-art ocean technology development*

(7) Capacity-building was required in the region for ocean resource research management, particularly by adopting the following:

- (i) Training of scientists and technicians for the operation and maintenance of modern oceanographic equipment.
- (ii) Development of infrastructure for oceanographic instrumentation.

- (iii) Regular exchange of data and information through regional workshops and symposia.
- (iv) Acquiring expert services from within and outside the region in the modern oceanographic fields, such as numerical modelling with ocean drifting buoy technology, deep-sea mooring systems, remote sensing, remotely operated vehicle technology and modern methods for seabed surveys.

#### *Disaster mitigation*

- (8) The capability of the region for the prediction of cyclones and typhoons, disaster mitigation measures and damage assessment should be enhanced by augmenting existing meteorological and other related systems, including the establishment of marine data buoy networks.

#### *Coastal erosion*

- (9) The capacity to study coastal erosion through various techniques, such as modelling, should be developed to assess the causes of coastal erosion and to design hard and soft solutions used for preventive and remedial measures.

#### *Sea-level monitoring*

- (10) The capability in the region should be enhanced for designing methodologies to monitor sea-level variations and networking on a regional basis. Models should be developed to assess the impact of sea-level variations on coastal environment and also the related socio-economic impact.

#### *Education and awareness*

- (11) The capability in the region for the promotion of environmental management education and awareness should be enhanced through the mass media and other means for public participation in integrated coastal zone management.

#### *Human resource development*

- (12) Centres of human resources development covering various aspects of management and protection should be identified in each country. Centres of excellence should be identified on a regional basis for the purpose of providing training to the personnel in member countries. In human resources development, the following disciplines are identified: (i) marine pollution monitoring; (ii) environmental impact assessment; (iii) marine living resources survey and assessment; (iv) marine non-living resource and assessment; (v) fisheries research and resource management; (vi) coastal and recreation tourism management; and (vii) environmentally friendly appropriate technologies.



#### **D. Suggested means of implementation of issues identified for capacity-building**

##### *Expertise and resources available in the region*

(13) The capacity-building requirements in the region could be met through using the existing capabilities within and outside the region. Such requirements in member countries could be met from centres outside the region through technical assistance, fellowships, training and experts services from the international donor agencies or through multilateral and regional arrangements. The expertise available in the region could meet the capacity-building requirements of member countries through bilateral and regional arrangements.

(14) The expertise which was available in the region and could be used was as follows:

Bangladesh - Mangrove management; disaster mitigation.

India - Environmental education, assessment and monitoring of marine pollution, prevention and control of coastal erosion, coastal circulation patterns, monitoring of sea-level variations, mapping and survey of marine resources, oceanographic research, development of information systems, coastal resource mapping with satellite imagery and development of potential fishing zone maps, combating of medium-sized oil spills.

Maldives - Ecotourism, coral reef management, island ecosystem management, sustainable methods of fisheries.

Pakistan - Training in oceanographic research, fisheries research, coastal research development, pollution monitoring, tidal prediction, seabed surveys, including bathymetric and hydrographic surveys.

Sri Lanka - Coastal zone management planning and implementation, erosion management, environmental impact assessment, ecosystem-based management planning and implementation, hydrographic surveys, coastal hydraulics.

##### *Technical assistance and training*

(15) Countries in the region might also take note of various ongoing programmes of IOC such as the Global Ocean Observations System, GIPME, Mussel watch, GLOSS and LOICZ, to impart training on relevant aspects of coastal zone management.

##### *Financial assistance*

(16) Countries in the region would in the first instance locate resources within the country for achieving capacity-building and, wherever necessary, assistance from bilateral and multilateral sources, as well as, international financial institutions, will have to be explored.

(17) SACEP would solicit additional technical and financial assistance for selected projects based on priorities determined by SACEP national focal points or the Governing Council, by approaching bilateral and multilateral agencies.

(18) The donor agencies such as UNDP, UNEP (through the South Asian Sea Programme), the Global Environment Facility (GEF), the World Bank, ADB and other international donor agencies should be approached for the funding of projects of regional significance and those of national priority.

### **VIII. ADOPTION OF THE REPORT**

(Items 10 of the agenda)

48. The Workshop adopted the report and recommendations on 23 December 1993.

*Annex*

**LIST OF PARTICIPANTS**

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