Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LMEs)

Third Session

Paris, France
13-14 June 2000

UNESCO

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ABSTRACT

The Consultative Meeting on Large Marine Ecosystems (LMEs) was held on 13-14 June 2000. The consultation was convened by the Intergovernmental Oceanographic Commission (IOC), the US Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), and the World Conservation Union (IUCN). It was sponsored by IUCN and hosted by IOC at UNESCO headquarters, Paris, France. The meeting was co-chaired by IOC Executive Secretary, Dr. Patricio Bernal, and Dr. Kenneth Sherman of NOAA-NMFS. A list of attendees is given in Annex II.

TABLE OF CONTENTS

1. INTRODUCTION

Dr. Ned Cyr, Technical Secretary of the LME Consultative Committee, called the meeting to order at 0900 on Tuesday, 13 June. Dr. Patricio Bernal, IOC Executive Secretary, welcomed all participants to UNESCO, Paris, and indicated the continuing interest on the part of IOC in the development and implementation of the science-based LME programme.

Dr. Bernal informed the meeting of the activities of the U.N. Advisory and Consultative Committee's Subcommittee on Oceans and Coastal Areas (ACC-SOCA) which he chairs. ACC-SOCA monitors and reviews progress in the implementation of relevant parts of Chapter 17 of *Agenda 21*, the goal of which is to promote the sustainable utilization and conservation of the marine environment and its resources, both in the oceans and in coastal areas. The Subcommittee also acts as an inter-agency facilitating mechanism for the implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities. As a means of promoting sustainable utilization and conservation of the marine environment, there is a significant opportunity for the Subcommittee to promote and coordinate the LME approach among the UN agencies involved, including IOC, UNEP, FAO, UNDP and UNIDO.

Dr. Sherman reported that the combined efforts of the World Conservation Union (IUCN), the Intergovernmental Oceanographic Commission (IOC), and the National Oceanic and Atmospheric Administration (NOAA) resulted in considerable progress since the last meeting held in March 1998. An outreach activity initiated in 1998 culminated in a mailing to 2600 marine experts around the world of a brochure produced by IUCN, entitled *An Ecosystem Strategy for the Management of International Coastal Ocean Waters.* The brochure announced the global campaign underway by the World Conservation Union, several United Nations agencies, and NOAA to improve global prospects for the long-term sustainability of resources and environments of international coastal waters. The theme followed in the brochure described the five LME modules and how they are applied in projects supported by the Global Environment Facility in developing countries for eliminating root causes of trans-boundary environmental and resource use practices that lead to serious degradation of parts of LMEs located around the margins of the world's ocean basins.

John Waugh of IUCN reported that the World Conservation Union was also committed to moving forward the implementation of LME projects in developing countries in partnership with IOC and NOAA. The designation by IUCN of its Washington Office as the location of its Global Marine Programme afforded opportunities for increased coordination with NOAA's senior staff engaged in LME project development.

2. ACTIVITIES AND ACCOMPLISHMENTS DURING 1998-2000

This section briefly summarizes actions taken over the past 24 months to implement recommendations of the March 1998 Consultative Meeting on LMEs.

Recommendations and summary of actions taken:

2.1 The Committee recommends implementation of outreach activities to ensure the public and scientific visibility of the LME concept be increased by preparation of material for

publication, and brief reports including the establishment of a website containing information on regional LME developments, meetings, and latest news.

Action: In collaboration with IUCN, a brochure and letter describing the LME global oceans campaign was mailed to 2600 marine experts around the world.

2.2 IUCN, in collaboration with other relevant bodies, should be encouraged to update the LME world map.

Action: The world map of LMEs was examined with marine experts at the WWF, and a joint paper describing how LMEs and ecoregions serve complementary resource assessment purposes was prepared. A project was initiated with Daniel Pauly of the University of British Columbia to merge the Longhurst biomes with the present map of 53 LMEs. In addition, a manuscript authored by Pauly, Longhurst, Sherman, and others describing the hierarchical merger was prepared for publication.

2.3 Recognizing that fishery statistics yield valuable information on LME status, FAO is asked to consider development of a mechanism to produce fishery statistics on an LME basis. A collaborative proposal (e.g., with ICLARM/University of British Columbia) for a medium-sized GEF grant, which also incorporates activities to apply the ECOPATH model, is suggested as a possible way to fund this effort.

Action: An effort was initiated with D. Pauly to generate value added products from global FAO fisheries-catch-data, using LMEs as the smaller regional unit for reporting fish-catch-yields. As a follow-on activity, funds are being sought by Dr. Pauly from the GEF in collaboration with NOAA and IUCN to pursue a medium-size grant to support the application of the ECOPATH model for each of the LMEs, beginning with LMEs adjacent to developing countries.

2.4 Existing and future LME projects should continue to consider the applications of new technologies and techniques to assess the status and changes in LMEs, including the SeaWiFS Satellite Ocean colour sensor and towed undulating oceanographic sensors and recorders, including the NuShuttle and SeaSoar.

Action: The follow-on actions consisted of studies by J. O'Reilly of the NOAA-NMFS Narragansett Laboratory. He is the NOAA expert on the NASA team to develop an improved algorithm based on *in situ*/satellite sensor comparisons for the SeaWiFS satellite.

2.5 In recognition of the critical role of science in providing information to support effective management and sustainable development of marine resources and ecosystems, the Committee encourages LME projects to improve linkages between science-based resource assessments and estimates of socioeconomic benefits of sustainable management. It also encourages partners in the LME activities to further elaborate mechanisms for making those linkages.

Action: The NOAA Sea Grant Office granted $500,000 to the Environmental and Natural Resource Economics Department of the University of Rhode Island to conduct a study on the "Human Dimensions of Large Marine Ecosystems."

Action: The University of Rhode Island has organized a faculty team of specialists in marine policy, environmental and natural resource economics, and sociology to convene workshops and develop the LME socioeconomic and governance module components. The LME Human Dimensions Group (LME/HDG) is completing a case study of the socioeconomics of the U.S. Northeast Shelf LME. In addition, the URI team as well as a group from the Marine Policy Center of the Woods Hole Oceanographic Institution is continuing to develop economic models for improving the economic valuations of LMEs. Both the URI and WHOI groups have produced reports describing their initial results (see Section 4).

2.6 Meeting participants recognize the potential of *marine protected areas* (MPAs) as one of the tools for the management of marine resources within the context of the large marine ecosystems. The Committee recommends a process be set in motion by IUCN and others to review the role of MPAs within the context of broader management objectives of LMEs and where appropriate, encourages development of case studies and demonstration projects and linkages with existing pertinent projects.

Action: The LME Programme Office in Narragansett, IR of Iran compiled a list of actions leading to the designation of sites within the NE Shelf LME as marine protected areas, where commercial fishing was severely reduced to enhance the recovery of depleted haddock, cod, flounder, and scallop populations.

2.7 The LME projects supported through grants from the GEF are, according to the GEF Operational Strategy, *"to assist countries in changing the ways that human activities are conducted in different economic sectors so that the particular LME and its multi-country drainage basin can sustainably support the new patterns of human activities."* The GEF places priority on changing sectoral policies and activities responsible for the root causes of the most serious trans-boundary environmental problems. To ensure that new practices and activities are balanced and integrated, it is recommended that countries participating in LME projects ensure that science-based assessments of ecosystem productivity, fish and fisheries, pollution and ecosystem health are appropriately integrated with socioeconomic and governance considerations leading to the long-term sustainability of marine resources.

Action: In collaboration with the GEF and several UN agencies, and with the cooperation of IUCN and IOC, approximately $114 million has been granted to 58 developing countries in Asia, Africa, Latin America, and eastern Europe to plan and implement GEF-funded LME projects. Each of the projects is developing innovative methodologies for "operationalizing" the 5 LME modules in a systematic strategic approach to resource development and sustainability.

2.8 In recognition of the importance of strengthening the scientific basis for improving the assessment, monitoring, and management of LMEs, consultations should be undertaken with UNEP Regional Seas Programme and other large-scale and long-term oceanographic and environmental programmes focused on monitoring global changes in the oceans and improving the understanding of marine ecosystem structure and function (e.g., GLOBEC, GOOS, and JGOFS). The consultations would be arranged by the IOC Secretariat with the express purpose of promoting, where appropriate, the identification of linkages between national and regional programmes and LME projects that are operational and/or in advanced stages of planning.

Action: The LME approach to resource assessment and management was introduced to the participants of 5th Session of the IOC Regional Committee for the Central Eastern Atlantic (IOCEA) held in Dakar, Senegal in May 2000. The representatives of the nations in attendance endorsed the initiation of LME projects for the Canary Current, Agulhas Current, and Somali Current LMEs. They also endorsed the initiation of the second phase of the Guinea Current LME project. In addition, they supported the need for strengthening linkages between LME projects and LMR-GOOS, Living Resources projects of the IOC programmes, and international biological oceanographic programmes (e.g., BENEFIT, GLOBEC). The Benguela Current LME also has been designated as a pilot project of LMR-GOOS.

3. REPORTS ON THE PLANNING AND IMPLEMENTATION OF LARGE MARINE ECOSYSTEMS ASSESSMENTS AND MANAGEMENT PROJECTS

The Committee welcomed a series of presentations on the status of LME planning and implementation for projects around the globe.

3.1 YELLOW SEA LME

Professor Qisheng Tang indicated that good progress was being made on the completion of the initial Block B phase of the Yellow Sea LME project (YSLME) funded with $350K from the GEF and administered by the UNDP offices in Beijing and New York. In this project, China and Korea have agreed to cooperate in a 5-year $25 million GEF-funded implementation of a project for the Yellow Sea LME. The project is based on a Trans-boundary Diagnostic Analysis (TDA) conducted jointly by scientists and marine policy experts from both countries. The key components of the project will include joint surveys and assessments of the fish and fisheries of the Yellow Sea LME, assessments of the carrying capacity, pollution, and health of the ecosystem. Special attention is to be focused on the socioeconomic benefits to be realized from improvements to the environment and sustainable development and management of the goods and services provided by the ecosystem for the densely populated coastal urban centres located along both the Korean and Chinese coasts of the ecosystem.

Professor Tang also described innovative GLOBEC projects initiated by China for the Yellow Sea, Bohai Sea, and East China Sea. He stressed the complementarity among the more basic science-oriented GLOBEC studies and the applied surveys and assessments to be made during YSLME implementation to support joint Chinese and Korean management practices.

3.2 BAY OF BENGAL AND CANARY CURRENT LMEs

Barbara Cooney of FAO, Rome provided an update on the planning for the GEF-supported Bay of Bengal project, and the status of the GEF Block B planning grant for the "Protection of the Canary Current Large Marine Ecosystem." At present, FAO is in the process of selecting a Principal International Expert to guide the preparation of the TDA and the Strategic Action Plan for the "sustainable management of the Bay of Bengal LME project."

Support for the project is high among the participating members of the Bay of Bengal Programme (BOBP). The BOBP countries have recognized the need to manage the coastal

and near shore areas in a coordinated, comprehensive and integrated manner. The Advisory Committee of the Bay of Bengal Programme at its 19th meeting (Jakarta, January 1995) urged BOBP to prepare a proposal and explore GEF as a possible funding source. The recommendation was subsequently endorsed by the Committee for the Development and Management of Fisheries in the Bay of Bengal (BOBC), which functions as the policy-level committee of the BOBP. The concept paper was endorsed by the BOBP member countries at the 20th Meeting of the Advisory Committee (March 1996, Pulau Langkawi, Kedah, Malaysia). Participating countries include Bangladesh, India, Indonesia, Malaysia, Sri Lanka, Thailand, the Maldives, and Myanmar.

The draft Canary Current Block B LME Project planning document is presently under review by the participating countries. Included in this cooperative activity are representatives from the seven coastal countries bordering the LME on the northwest Africa coast, including Morocco, Mauritania, Senegal, Gambia, Cape Verde, Guinea-Bissau, and Guinea.

During the planning phase emphasis will be on preparation of a TDA and SAP as in the other GEF-funded LME projects in West Africa. It was made clear, however, by the representative from Senegal participating in the Consultative Meeting, that fish and fisheries are a trans-boundary issue critical to the food security for the people inhabiting the region, particularly in Senegal and Mauritania, and will likely be a major focus of the project.

3.3 GUINEA CURRENT LME

Dr. Chidi Ibe, Coordinator of the Guinea Current LME project, provided a first-hand description of the development and implementation of the first 4-year phase of the project, 1995-1999, and the initial preparations for the second phase scheduled from 2000 to 2005. During the initial phase of the project the six participating countries - Benin, Cameroon, Ghana, Côte d'Ivoire, Nigeria, and Togo - made significant movement toward a commitment to improve the degraded environment and restore the depleted fish stocks of the countries in the region. Among the successful accomplishments were published assessments of important coastal zone issues to be addressed, a region-wide mangrove restoration activity, reduction of point source pollution, successful introduction of primary waste treatment, and a successful waste recycling system contributing to improved environmental conditions.

Capacity building strides were made with the training in a series of workshops, study groups, and meetings of a cadre of 900 cooperating LME marine specialists, production of a bilingual French-English outreach newsletter for the project, activation of several NGO groups in project outreach actions, the planning and conduct of the first-ever completely African bottom trawl survey of the fish community of the Gulf of Guinea with joint participation by fishery scientists from each of the five participating countries on board a chartered fishing vessel. The results of these activities were, with the kind financial assistance of IUCN, presented during a special session held at the annual meeting of the American Association for the Advancement of Science in Washington, DC in February 2000. The session, entitled "Africa Meets the Challenge," was the subject of an audio-taped production that brought together key persons from Africa engaged in the first phase of the project with representatives of the donor countries and organizations including the GEF, UNDP, NOAA-NMFS, and representatives of the countries of Cameroon, Ghana, Nigeria, and Côte d'Ivoire participating. They were later joined by visiting scientists from Mozambique in a Round Table discussion sponsored jointly by AAAS and IUCN. In keeping with the guidelines of the donor countries supporting the GEF, the Environmental

Ministers of the participating countries made known their commitment to the principal objective of the project, namely the pursuit of economic development that ensures safeguards against any further environmental or resource degradation, and promotes long-term resource and ecosystem sustainability. The language used by the Ministers is in the form of an official statement known as the *Accra Declaration*. It is included in this report as Annex III, along with a selected list of outputs from the first phase of the project.

The second phase is to be extended over the entire spatial dimension of the Guinea Current LME and will include participation of 10 more countries, Sierra Leone, Sao Tome and Principe, Liberia, Equatorial Guinea, Guinea, Guinea-Bissau, Gabon, Democratic Republic of the Congo, Congo, and Angola.

3.4 BENGUELA CURRENT LME

Dr. Michael O'Toole presented the Committee with a briefing on the successful Block B phase of the Benguela Current LME (BCLME) project along with the highlights of the SAP to be initiated during the implementation phase of the project. Based on the excellence of the analyses conducted during the preparatory Block B series of workshops with key stakeholder groups, the SAP phase is to be funded at a level of $38 million. Of this amount, $18 million is to be financed by the GEF, to cover "incremental costs" over five years. The matching funds of $20 million represents baseline commitments to the project in personnel and facilities made available by Angola, Namibia, and South Africa, the three participating BCLME border countries.

The Trans-boundary Diagnostic Analysis document focused attention on the unique high productivity of the ecosystem and serious shortcomings in realizing the full socioeconomic potential of the ecosystem because of overfishing, harmful algal blooms, less than optimal industrial practices in offshore oil production, diamond mining, and fishing practices, particularly in relation to resource allocation between industrial and artisanal fishermen.

In addition to the joint fisheries surveys and assessments planned by the participating countries, the principal ministries serving as stewards of the environment and natural resources in each of the three countries (e.g., Environment and Tourism; Fisheries; Petroleum; Mining and Energy) signed and adopted the Strategic Action Plan. In addition, they established a new precedent for a Large Marine Ecosystem. They established an organization under the terms of the United Nations Convention on the Law of the Sea (UNCLOS), entitled *The BCLME Programme*, complete with 10 Principles to be followed, and 7 new Institutional Arrangements to carry the BCLME Programme forward. The key instrument for Programme implementation is the Interim Benguela Current Commission (IBCC). It was established to strengthen regional cooperation and be fully supported by a Programme Coordinating Unit (PCU) and subsidiary bodies, such as Advisory Centres and Groups. The IBCC will become a fully functional Benguela Current Commission (BCC) with a supporting Secretariat within a period of five years after formal commencement of the BCLME Programme. Five Advisory Groups will support the IBCC: (i) Advisory Group on Fisheries and Living Resources, (ii) Advisory Group on Marine Environmental Variability and Ecosystem Health, (iii) Advisory Group on Marine Pollution, (iv) Advisory Group on Legal Affairs and Maritime Law, and (v) Advisory Group on Information and Data Exchange. The full title of the historic Strategic Action Programme is entitled *Integrated*

Management, Sustainable Development and Protection of the Benguela Current Large Marine Ecosystem (BCLME).

3.5 HUMBOLDT CURRENT LME

Dr. Rudolfo Serra presented an update on the preliminary planning underway for initiating a Block B GEF Grant entitled *Integrated Management of the Humboldt Current Large Marine Ecosystem*. Dr. Serra pointed out that both Peru and Chile have reached agreement on the project objectives. Specifically, the project would significantly enhance national and regional efforts to move towards sustainable integrated management of the Humboldt Current Large Marine Ecosystem (HCLME). The first steps in this process will be the establishment of a mechanism for regional cooperation, a review of the existing knowledge of the status and threats to the HCLME, and the development of a Trans-boundary Diagnostic Analysis (TDA) and a preliminary Strategic Action Programme (SAP) to address both these threats and the gaps in knowledge essential to the sustainable management of the ecosystem. In addition to assisting in the development of the TDA/SAP, the GEF role in the resulting project is expected to focus on the strengthening of effective consultation, coordination and monitoring mechanisms, the development of institutional capacity, the continued brokering and coordination of donor support, and the direct support of some of the priority activities identified in the SAP. Among the trans-boundary problems to be addressed by the two countries in the Block B phase are the:

- increasingly frequent ENSO events, their impacts on abundance and distribution of fish stocks, resulting difficulties for fisheries management, and negative social, economic and human health consequences;
- locally significant coastal pollution, including sewage, industrial waste, and petroleum, and negative impacts on human health, coastal tourism and coastal living marine resources;
- long-term regime shifts, associated with climate variability that impact fish stocks;
- the need to improve the capacity to assess, monitor and manage the system from an international, multisectoral, integrated perspective;
- the need to enhance the international regime for more sustainable management of the HCLME's rich living marine resources;
- loss of biodiversity due to overfishing, which has already threatened or endangered sea otters, sea lions, and some sea birds and whales;
- severe coastal habitat degradation near sources of pollution including fish processing plants (nutrients), copper mining (heavy metals), and thermoelectric plants (heat pollution);
- increased anoxia in HCLME bottom waters when primary and secondary producers, not consumed because fish stocks are overfished, fall to the sea floor and decompose.

The two nations are aware of the need to improve the monitoring, assessment and management of this ecosystem as a whole to the extent that is required. However, they are moving to strengthen regional programmes related to management and protection of living marine resources, and to increase cooperation on management of the ecosystem as a whole. In particular, they expect that with support of the GEF they can not only secure a broad range of national economic benefits, but can do so while sustaining the ecological capital of the LME, and also generating significant global environmental benefits in terms of the maintenance of this extraordinarily productive waterbody. These benefits can be achieved through the cooperative and system-wide application of science to the evaluation of the

current status, monitoring and management of the HCLME to ensure the long-term sustainability of its living marine resources.

3.6 NORTH SEA ECOSYSTEM AND THE SIMCOAST SYSTEM

Dr. McGlade presented an update on activities related to ecosystem-based management for the North Sea LME. Among the confounding factors with regard to management is the emergence of the policies of the European Union, the move by the Nordic Environmental Ministers toward ecosystem-based management, and the efforts underway in ICES to support both efforts with the appropriate scientific assessments of the changing states of the North Sea ecosystem. Although fisheries assessment and management are important, Dr. McGlade indicated that with appropriate political will, measures could be taken based on available scientific information on the demography of the fish stocks to implement a workable system of sustainable management for the stocks. However, Dr. McGlade's prime concern was with the continuously degrading state of the ecosystem from the release of ballast water and introduction of alien species, and the continuous introduction of carbon compounds into the sediments and trophic structure of the ecosystem. Dr. McGlade called attention to the accumulating benthic mats of polysaccharides produced by benthic bacteria that are a potential source of release of toxic compounds. In addition, Dr. McGlade stressed the importance of improving valuation estimates for the North Sea and other LMEs. She indicated that marine ecosystems are presently seriously undervalued with estimates of goods and services provided to society based on a sector by sector evaluation. Dr. McGlade stressed the need for introducing forward-looking and integrated socioeconomic and governance considerations as a major consideration in management of LMEs, particularly in the age of e-commerce where it is expected that "futures" could be traded electronically for fish, alginates, sand and other marine minerals, petroleum and gas, and coastal tourism, and real estate development potentials. Dr. McGlade briefly described the laptop-based SimCoast system and its capacity to assist managers in making decisions on the introduction of LME management practices for achieving greater resource sustainability than is presently practiced.

3.7 THE BALTIC SEA

Considerable activity has been underway since 1998 for advancing toward a fully implemented Baltic Sea LME project. Initial steps taken in late 1998 included the submission of a Block B Grant to fund a Baltic Sea Regional Project with a Baltic Sea LME component and a Land-Based Agricultural Run-Off component. The project will introduce ecosystem-based assessment and management to the emerging democratic countries in the eastern Baltic including Estonia, Latvia, Lithuania, Poland, and Russia. They will be developing, with funds from a GEF Block B grant, a Trans-boundary Diagnostic Analysis and Strategic Action Programme planning during the first phase of the project. This is to be followed by a 5-year implementation phase wherein the LME modules - productivity, fish and fisheries, pollution and ecosystem health, socioeconomics, and governance - will be operationalized in accordance with cooperative and integrated surveys and assessments of nearshore and Baltic-proper resources and environment.

The GEF project will contribute to programmes of three leading institutions operating in the region: ICES, providing scientific expertise and coordination skills to the project, the International Baltic Sea Fisheries Commission (IBSFC) bringing fish stock assessments to

the projects, and HELCOM representing activities to reduce pollution-induced stress on the Baltic ecosystem.

Dr. Jan Thulin is serving as the Project Coordinator on behalf of ICES. It is likely that the project Executing Agency, the World Bank, will submit the final planning documents to the GEF in September in anticipation of initiating the project implementation phase in October 2000.

3.8 SOMALI CURRENT LME

Dr. Amani Ngusaru of Tanzania, kindly provided the meeting with a description of the interests of Tanzania and the Institute of Marine Sciences (IMS), Zanzibar in moving forward with Kenya to a GEF Block B planning Grant for a Somali Current LME project. He indicated that IMS and the Tanzania Government are still committed and support a Somali Current LME project for ensuring the sustainability of its marine resources.

The interest of the Tanzania Government is mainly in two areas: (i) fisheries, and (ii) pollution and ecosystem health. Both have an impact on the tourism industry in general and on coral reefs, mangroves, and other living resources including marine mammals, marine birds, and mollusks. These problems do not observe national boundaries and will require a trans-boundary regional approach as that suggested under the LME approach. IMS has the capability to carry out assessments in these areas. However, due to lack of a research vessel and resources, the research is confined to the inshore waters. Nothing has been done or is known on the status of offshore waters. It is therefore expected that the Somali Current LME project will help in expanding near-coastal assessments to offshore waters. Two specific and immediate interests of IMS are to reduce stress and degradation of the coastal habitats, including coral reefs, mangroves, and shoreline erosion.

The LME project would provide the needed support to provide initial assessments of the size and extent of the renewable resources of the Somali Current LME in relation to the potential for systematic expansion of the fisheries in order to improve the lives of people in coastal areas.

The IMS is involved in a Science for Management project that will support the LME initiative at local, national, and international levels. This project provides the scientific knowledge that is needed in the development and implementation of a Coastal Management Policy for Tanzania. The project is jointly carried out by the Tanzania Government and the University of Rhode Island under USAID support. IMS, under the Science and Technical Working Group of the Project, has provided:

- the synthesis on the state of existing scientific knowledge in coral reefs, mangroves, water quality, shoreline erosion, fisheries, and other marine living resources;
- an annotated bibliography;
- summary of the Coastal Ecosystem Profile for Tanzania;
- Reference Location Guide for all the available marine science literature in Tanzania;
- a directory of all marine scientists in Tanzania.

This comprehensive review has provided a list of gaps in terms of natural sciences and outlined some management recommendations. This is a good initial effort in the assessment of the status of the resources that can be built in the much broader LME

programme. The IMS is prepared to carry out systematic assessments, in collaboration with Kenyan marine specialists, of the resources and provide for the establishment of a management framework aimed towards the long-term sustainability of resources and economic and nutritional benefit to the people in the coastal region of Tanzania and Kenya sharing the natural resources of the Somali Current LME.

4. THE HUMAN DIMENSIONS OF LMEs (SOCIOECONOMICS AND GOVERNANCE MODULES)

It was apparent from a general discussion of socioeconomics and governance that the approach underway at the University of Rhode Island by a team of marine specialists in economics, policy, and sociology could bring a useful perspective to the "operationalization" of the LME socioeconomics and governance modules. Dr. Grigalunas kindly provided the Committee with an overview of the Team activity underway at URI on what they refer to as *The Human Dimensions of LMEs (HD/LMEs).*

Monitoring and assessment are prerequisites to effective management of LMEs threatened by pollution, over exploitation and other misuses of these important resources. Furthermore, management involves altering human behaviour, especially behaviour that threatens, directly or indirectly, the sustainability of LME resources. Therefore, there is a need to understand the human system and its relationship to the sustainability of LME resources and their services.

4.1 URI - HD/LMES

Human and ecological systems are both composed of complex webs of interrelated components and processes. Interactions occur both within each respective system and between systems. The URI Team views the natural environment and related human dimensions as a set of interrelated components and processes rather than isolated elements that act independently. The Committee was also introduced to a study underway by the Marine Policy Center of the Woods Hole Oceanographic Institution on methodologies for improving valuations of LMEs.

Ecological components of an LME can be viewed as, among other things, biophysical capital (i.e., stocks of valuable natural resources). The various forms of the biophysical capital generate flows of goods and services, many of which are directly or indirectly used by humans (e.g., in fishing and shipping activities) and ecological goods and services, some of which are transformed into market or non-market goods and services that are cycled through the economy. These flows also include outputs of processes that are returned to the environment, sometimes as wastes.

Traditionally, property rights are poorly defined in the coastal zone and marine areas. Externalities impact fishermen, recreation, and other activities that rely on the natural system for the quantity and quality of goods and services from these capital assets. Human activities that use or impact the biophysical capital of a typical LME may occur on land, in the coastal zone, or in off shore areas. High human population densities in the coastal regions and associated manufacturing, transportation and extractive activities often result in environmental degradation and overexploitation, by that reducing the value of natural assets. Municipal sewage and industrial waste disposal in coastal waters often overwhelm the

assimilative capacity of marine areas. Nutrient pollution may result in large increases in phytoplankton production and microbial activity -- eutrophication. Fish and shellfish populations that are dependent on estuaries as essential habitat may be harmed, displaced or rendered unfit for human consumption. In virtually all of these examples the five LME modules - productivity; fish/fisheries; pollution/ecosystem health; socio-economics; and governance - are interdependent wherein a change in one module will have impacts on other modules.

4.2 MONITORING AND ASSESSMENT

There are several steps in the process of monitoring and assessing the human dimensions of an LME and the use of its resources. They are as follows:

(i) Identify principal uses of LME resources
(ii) Identify LME resource users and their activities
(iii) Identify governance mechanisms influencing LME resource use
(iv) Assess the level of LME-related activities
(v) Assess interactions between LME-related activities and LME resources
(vi) Assess impacts of LME-related activities on other users
(vii) Assess the interactions between governance mechanisms and resource use
(viii) Assess the socioeconomic importance of LME-related activities and economic and sociocultural value of key uses and LME resources
(ix) Identify the public's priorities and willingness to make tradeoffs to protect and restore key natural resources
(x) Assess the cost of options to protect or restore key resources
(xi) Compare the benefits with the costs of protection and restoration options
(xii) Identify financing alternatives for the preferred options for protecting/restoring key LME resources

These steps provide information to management authorities, especially with regards to the efficacy of management policies. Most of these steps should be repeated periodically to update the information on the status of the LME. This information is an essential ingredient of the adaptive management approach, which requires frequent evaluation and feedback to take full advantage of experience and learning.

An example of the application of the Human Dimensions approach to quantification and economic valuation of ecosystem goods and services was given by Dr. Grigalunas using the Peconic Bay of Long Island, New York as the case study. The estuary and surrounding watershed are very attractive and used intensively, particularly during the peak summer season. The estuary itself has generally good water quality. However, pollution exists and threatens some uses; for example, extensive shell fishing grounds have been lost due to pollution. Also, development has caused the loss of important habitats/ecosystems and threatens the scenic amenities of the area. Thus, many market and non-market valued resource goods and services are at issue in this case -- as is true in most other coastal and marine cases.

Working closely with programme managers, scientists, and citizen advisory groups, a series of studies has been carried out to:

- estimate the economic importance of estuary-related activities

- identify coastal users, their activities, and concerns, using two carefully prepared surveys
- identify the public's priorities and willingness to make tradeoffs to protect and restore key natural resources using a second carefully developed survey
- estimate the economic value (benefits) of key:
  - recreational uses
  - coastal amenities
- assess wetland productivity and habitat services
- assess the cost of options to preserve or restore key resources
- compare the benefits with the costs of preservation and restoration options
- help select financing alternatives for the *preferred* options for preserving/restoring key natural resources

Preliminary results indicate that estuarine-related activities play a major role in the livelihood of several thousand residents who own, operate or are employed by over 1,000 businesses in some 24 identified sectors. These sectors engage in or support such activities as fisheries, marine transportation, and particularly tourism and recreation.

It was also found that over a hundred thousand people annually engage in millions of days of recreational activities, and preliminary estimates of the value of key recreational activities range from $8.59 per trip for beach use to $38 for a recreational fishing trip. The total annual value across the three recreation activities studied to date is over $50 million per year, again based on preliminary results. These are economic benefits to users above the costs they incur (i.e., Consumer surplus or "unpaid-for benefits").

An interesting and potentially very important part of this work is that the results suggest that users of coastal areas are affected by water quality. The link between objective water quality measures and subjective measures of quality as perceived by recreationists affects users' perceptions on, for example, the extent of swimming (number of trips taken). This link is used to estimate the changes in various measures of water quality due to policies being considered to control pollution. Given the cost of such control measures and of preservation and protection measures allows for a comparison of the benefits with the costs of these policies.

Preliminary survey results also suggest that the public holds strong values for preserving key coastal natural resources. These results are supported by preliminary results from a separate, housing value study, done for the same coastal area. This study indicates that residents are willing to pay more for property located near coastal waters, parks, and open space.

A wetland productivity study of the value of eelgrass, inter-tidal salt marsh and mud flats yielded preliminary results for the marginal value (asset value) ranging from $12,000 per acre for eelgrass to $4,400 per acre for mud flats. These estimates include the estimated market value of fish and shellfish "produced" by these ecosystems and harvested; the value of waterfowl hunted and birds viewed. The value estimates include only food web effects and habitat values, and hence are conservative in that such services as shoreline erosion protection and storm protection services provided by salt marsh, for example, were not considered. Estimates of economic value (benefits) of these three types of wetlands contribute to benefit-cost studies of management proposals for restoration of habitats.

As noted, ongoing work will examine the cost of options for preserving and restoring resources, compare the benefits with the costs for different options and help select financing alternatives for the preferred options. An important aspect of this work is the willingness and commitment among the programme managers and participants to work together to link socioeconomics, natural resource science, and policy.

Dr. Grigalunas also outlined a study to assess the economic costs to fisheries of marine disposal of dredged materials. The study uses a bio-economic framework to assess the economic costs to recreational and commercial fisheries from potential disposal of 5.1 million cubic yards of clean sediment at seven marine sites. Short-term, long-term and ecosystem losses are assessed. Such valuation studies put external costs of port development in perspective, can help select among disposal sites, and can contribute to benefit-cost analyses. The reference to this work is a paper submitted to the Transportation Research Board, National Research Council, "Estimating Environmental Costs in Port Development: A Case Study of the Costs to Fisheries of Dredge Disposal".

The reference to the complete Human Dimensions study by the URI Team is: A Framework for Monitoring and Assessing Socioeconomics and Governance of Large Marine Ecosystems. URI and NEFSC/NOAA-NMFS. Sept. 1998. Final Report to NOAA Contract 40ENNF700378.

4.3 WHOI-NMFS HD TEAM

The Woods Hole Oceanographic Institution (WHOI) Marine Policy Center's Team focused on developing methodologies to improve *valuation* of LMEs. The Team produced two important reports in cooperation with the Social Science Branch of the Northeast Fisheries Science Center, NOAA-NMFS, Woods Hole. Their initial results demonstrate the *undervalued* status of *all* of the LMEs. If government stewardship agencies and ministries are to provide the proper match between *needed* assessment and management systems for LMEs and the funds to support them, a far clearer picture of the actual value of the *sustainable* level of goods and services from *healthy* LMEs needs to be brought forward to the attention of the public at large. Until the compelling arguments clearly demonstrating the persistently high costs in *lost socioeconomic benefits* can be effectively presented to government ministries, the national self-financing of GEF-supported LME projects will remain problematical.

Based on the application of an input-output model and data set using a commercially available economics-based programme (IMPLAN Professional®), the WHOI Team estimated economic activity related to the U.S. Northeast Shelf ecosystem at an astounding level of $376 billion, and an employment impact on 4 million persons. The study is preliminary, and the interactions among the economic sectors examined and their effects on economic activity need to be examined more closely in future work. The report is available from the WHOI Marine Policy Team where it is referenced as: 1999, Economic Activity Associated with the Northeast Shelf Large Marine Ecosystem: Application of an Input-Output Approach. Hoagland, P., D. Jin, E. Thunberg, and S. Steinback, Marine Policy Center WHOI. Ref. Ord No. 40ENNF800239. U.S. Dept. Commerce, NEFSC, Woods Hole. 19pp.+ figures & tables.

4.4 OTHER LME HUMAN DIMENSIONS REPORTS

Two reports relevant to the Socioeconomics and Governance Modules were produced. Dr. Jon Sutinen of URI teamed with Sang-Go Lee (Department of Fisheries Business Administration, Pukyong National University, Pusan, Rep. of Korea) to produce a study entitled *Large Marine Ecosystems: Socioeconomic and Governance Implications for Korea*. It moves from a generic approach to a case study for the Yellow Sea LME, and is published in: *Korea Observer* 30(1): pp. 9-58, 1999. The other report is by Dr. Larry Juda of the Marine Policy Department at URI, who is an expert on governance. His article is entitled *Considerations in Developing a Functional Approach to the Governance of Large Marine Ecosystems*. It appeared in: *Ocean Development and International Law* 30: pp. 89-125, 1999.

5. LMEs AND GOOS

Dr. Ned Cyr provided a brief presentation on progress in the development of a strategic design for the Living Marine Resources Module of GOOS (LMR-GOOS). The LMR-GOOS Panel has advocated an ecosystem approach to marine resources conservation and management. Much of the information identified by the Panel as critical to support ecosystem-based management (e.g., productivity and fish surveys) is provided regionally by LME monitoring and assessment programmes. In recognition of this, the Benguela Current LME project has been designated by the Panel as an LMR-GOOS pilot project.

Regional LME monitoring and assessment projects, such as the Guinea Current LME, Yellow Sea LME, Humboldt Current LME, Baltic Sea LME and others, provide one of the best opportunities to support development of GOOS in developing countries. GOOS should work closely with the LME programme to ensure the complementarity of regional efforts.

6. UNIDO

Dr. Zoltan Csizer provided the Committee with a profile of the contributions made by the United Nations Industrial Development Organization while serving as Executing Agency on behalf of the GEF and UNDP for the first phase of the Guinea Current LME project. Much of the success of the project was in the excellent organizational support provided to the project coordinator, Dr. Chidi Ibe, by the UNIDO organization.

The strategic goal of UNIDO is to pursue sustainable industrial development in developing countries and economies in transition through the creation of competitive economy, productive employment, and environmental protection, the so-called "Three Es." About two thirds of the world's economic activities are concentrated in coastal areas and therefore their ecosystems are over-stressed and become fragile. Since a significant portion of these activities are of industrial nature generated by manufacturing, environmental and service industries, UNIDO has the operational capability to address the needs of administering a Large Marine Ecosystem project. UNIDO's experience gained as an Executing Agency of the pilot phase of the GEF/UNDP financed Gulf of Guinea LME Project has prepared the Agency to support future GEF/LME projects in Asia, Africa, and Latin America.

UNIDO has contributed to the LME Pollution and Environmental Health module. Specific application has been made of the UNIDO methodology of transferring environmentally sound technologies (TEST) to reach environmental compliance at least cost. TEST is a useful tool developed by UNIDO to prevent marine pollution caused by land-based industrial point sources.

7. MARINE PROTECTED AREAS

The 2nd LME Advisory Group recommended that work be undertaken by IUCN on the relationship between LMEs and Marine Protected Areas (MPAs). John Waugh, IUCN Marine Coordinator, noted that work was ongoing on the use of protected areas at an ecosystem scale for fisheries management, and that a workshop on the subject would be organized by IUCN and NOAA at the next International Coral Reef Symposium, to be held in Bali, Indonesia, in October 2000. It was suggested that the five LME modules provided an appropriate analytical framework for the establishment of a network of MPAs within an ecosystem, covering a full range of management objectives. This would include management measures for productivity, socioeconomic benefits, and governance (e.g., conflict mitigation through trans-boundary protected areas), as well as biological diversity. Under the analytical framework of an LME, MPAs could provide not only representative samples of habitats, but protection for *ecological processes* (e.g., recruitment of species; maintenance of hydrological cycles).

Waugh suggested that while some LMEs (e.g., the North Sea) had reasonably good protected area coverage, that such coverage was generally developed *ad hoc*, and that a more systematic application of data organized through LME processes could potentially yield a much more efficient and effective allocation of management resources.

It was noted that this approach is factored into the strategic action for the Benguela Current, and that the application in the Benguela could point the direction for other LMEs coming on line, including the Canary Current and Guinea Current LMEs. Other areas where MPAs were incorporated in LMEs included the NE Atlantic Shelf and the Yellow Sea LMEs.

It was also noted that beyond MPA managers, LMEs also needed to integrate coastal zone management networks, and that management within the LME context went beyond strictly protected areas. There is significant terrestrial experience that could be applied here.

Waugh noted that MPAs provided a concrete application of the LME analytical framework, and because it contributed substantially to strategies for a number of management processes, could be an important component of the ongoing LME outreach strategy. He suggested that a study be undertaken and presented through a panel presentation at the Fifth World Parks Congress (Durban, South Africa, September 2002).

8. LME PROGRAMME OFFICE REPORT

8.1 PROJECT DEVELOPMENT

The LME project development activity is a service function to coastal countries with developing economies in Asia, Africa, Latin America, and eastern Europe who seek GEF funding for "country-driven" LME projects. During 2000, the LME Programme Office will

continue project development in collaboration with developing countries and IUCN, IOC, UNIDO, UNDP, UNEP, FAO, and the GEF. Among the high priority LMEs designated for country-driven project initiation are the Humboldt Current, the Pacific Central American Coastal, the Caribbean Sea, and the Patagonian Shelf in Latin America; the Baltic in eastern Europe; the Guinea Current, Canary Current, and Benguela Current in west Africa; the Agulhas Current and Somali Current in east Africa; and the Gulf of Mexico in North America. The Office will continue to work with coastal countries in Asia to advance the Yellow Sea and Bay of Bengal projects for the Trans-boundary Diagnostic Analysis planning phases to the implementation of Strategic Action Programmes.

8.2 BIOMASS YIELDS AND CATCH STATISTICS

Activities are planned to advance ecological studies within the LMEs. Among the challenges are refinements to the application of ecological criteria leading to a better understanding of the carrying capacity of LMEs in relation to fishery biomass yields. The LME Programme Office anticipates collaborating with Dr. Pauly and his colleagues at the University of British Columbia on three scientific activities: (i) application of the Pauly-type Ecopath energetic models to each of the LMEs; (ii) developing and implementing a methodology for assigning annual FAO global catch statistics to each of the 53 LMEs; and (iii) participating in the development of a global hierarchical construct to accommodate the Longhurst biogeochemical global ocean areas and the LMEs in a compatible biogeographical zonation structure that would focus on LMEs as principal units for global resource and environmental assessment and management actions.

8.3 NEWLY DESIGNATED LMEs

Based on information provided in several working group meetings on LMEs in Australia attended by a representative of the Programme Office (P.O), the Australian Government announced and the P.O. concured with the designation of the South Eastern LME extending from Fraser Island to Cape Howe with an offshore extension ranging from 100 to 200 miles offshore into the Tasman Sea. In a peer-reviewed paper for the volume on Global Perspectives of LMEs to be published by Elsevier Press, Drs. Werner Ekau and Bastiaan Knoppers propose the designation of three LMEs for the coast of Brazil, in place of the present two. The P.O. concured with the recent analyses of new information presented in the paper, and redefined the coastal areas and boundaries into the North Brazil Shelf, the East Brazil, and the South Brazil Shelf LMEs, replacing the Northeast Brazil Shelf and Brazil Current LMEs. In the same volume, Drs. Daniel Pauly and Ratana Chuenpagdee propose, on the basis of recent data and analyses, the Gulf of Thailand as an LME, a designation with which the Programme Office concured.

8.4 GLOBAL INTERNATIONAL WATERS ASSESSMENT (GIWA)

The Programme Office will continue efforts to assist the UNEP and University of Kalmar, Sweden teams in carrying forward a Global International Waters Assessment based largely on LMEs as the principal assessment units. The GEF has provided a grant of $7 million to support the activity that is presently augmented by an additional $7 million of "in-kind" scientific and technical assistance. NOAA will be investing approximately $1.5 million of "in-kind" assistance over the three-year project period.

8.5 OUTREACH

Activities will continue with the IOC and IUCN in an outreach campaign to a network of 2,800 LME contacts in Asia, Africa, North America, Latin America, and Europe. The LME network has been provided with brochures describing the modular assessment approach suggested for implementation in GEF-supported LME projects.

8.6 MEETINGS AND WORKSHOPS

Meetings, consultations, workshops, and symposia are to be continued as a useful means for exchanging views and planning projects on the application of the LME approach to resource assessment and management actions. Among LME gatherings already completed were several workshops on the Baltic Sea LME, in Sweden and Copenhagen; a workshop with senior representatives from Chile and Peru on the Humboldt Current LME in Callao, Peru; two Steering Committee meetings of the GIWA in Sweden; and two technical workshops and Steering Committee meetings in Beijing and Seoul for the Yellow Sea LME project. Consultations have been held at the UN in New York with UNIDO on long-term strategies for the agency in regard to advancing the LME approach. A symposium entitled *Africa Meets the Challenge: Guinea Current Ecosystem Assessment and Management* was held at the Annual Meeting of the AAAS in Washington, DC. Deputy Assistant Administrator of US NOAA for Fisheries, Andrew Rosenberg, represented NOAA both at the formal symposium and at the subsequent round table on *Africa Meets the Challenge* held at the meeting with support from IUCN, UNIDO, NOAA, and AAAS.

For the Human Dimensions component of LMEs, a major workshop was held at the Alton Jones Campus of the University of Rhode Island with good attendance from academic, industry, and NGO communities. Progress is being made in developing improved indices for the changing states of LMEs and socioeconomic valuations of LMEs with senior staff at the University of Rhode Island and Woods Hole Oceanographic Institution. Upcoming are planning workshops for the Guinea Current, Canary Current, Agulhas Current, Somali Current, Bay of Bengal, Gulf of Mexico, and Caribbean LMEs.

Invited presentations of the LME approach to ecosystem-based resource assessment and management were given to an IUCN-sponsored Polar Environmental Workshop in Montreal and the Oceanology 2000 meeting in Brighton, United Kingdom. Among the other invited speakers on the Oceanography 2000 Marine Policy Panel were the Executive Secretary of IOC, Patricio Bernal, the Science Advisor to the U.K., Sir Robert May, and the US Under Secretary for Oceans and Atmosphere, J. Baker.

8.7 LME WEBSITE

The website for LMEs has proven of interest to the biodiversity community. Dr. E.O. Wilson and his associate Dr. Dan Perlman have included LMEs as global units for coastal biodiversity conservation in their recently released CD-ROM, *Conserving the Earth's Biodiversity*. Peer-reviewed papers from future LME volumes (e.g., North Atlantic, Global Trends, and Gulf of Guinea) will be synthesized and added to the site. Links to other sites, whose contents are consistent with the goals of the LME strategy, have been added. With the inclusion of a sign-up page for the mailing list, over 40 names have been added to the LME mailing list database (which continues to grow and is presently at 2,800 addressees). With the capacity to monitor website visits with a "behind the scenes" programme, it is possible to

determine not only the number of website "hits", but where those hits originate, and which pages are of the most interest. After the mass mailing in March, website hits increased over 100% and have remained consistently higher than at any other time in the life of the site.

9. RECOMMENDATIONS

1. The Committee, in recognition of the unique "country driven" approach in the development and implementation of GEF supported LME projects, recommends that communication activities using multi-media methodologies, continue to inform the international marine environmental and resource institutions and networks of project accomplishments.

2. IUCN, in collaboration with NOAA and other relevant organisations should continue efforts to update the LME world map.

3. In recognition of the depleted state of a growing number of fisheries for marine species around the globe, efforts to assist FAO in reporting fishery statistics on an LME basis should be continued. In this regard, collaboration with the Marine Resources Group at the University of British Columbia recently funded by the Pew Foundation to expedite this effort should be continued.

4. Efforts to extend the application of the ECOPATH model and similar "carrying capacity" modelling efforts to LMEs around the Globe should be continued.

5. The Committee takes note of the significant advances made in improving ecosystem economic valuations, benefit-cost methodologies, and approaches for consideration of the overall human dimensions of LME projects. These advances continue to improve the linkages between science-based assessments of changing ecosystem states and the economic benefits and other societal effects to be derived from governance actions that support the long-term sustainability of marine resources, their biodiversity, and habitats.

6. The utility of Marine Protected Areas (MPAs) as a critically important tool for the recovery of biomass and sustainability of biodiversity has been successfully demonstrated for the North-East shelf ecosystem. The Committee encourages further development of demonstration projects and case studies in collaboration with LME projects in Africa, Asia, Latin America and Eastern Europe. The Benguela Current LME Project was proposed as an ideal demonstration project for this approach.

   To advance the utility of MPAs within LMEs in improving the conservation of biodiversity and sustainability of marine resources, the Committee established a Contact Group of O'Toole, McGlade, Gaye, Grigalunas, Cyr and Waugh. This group will, (within available resources) commission a Study Paper on the application of the LME concept to MPA system design at an ecoregional unit-scale, using the Benguela Current LME as the example. The Study Paper will be made available to the IUCN World Commission on Protected Areas.

7. The Committee was pleased to learn of the significant advances made in China to link

the practical application of the 5 LME modules to advances being made in achieving a better understanding of the structure and function of the Yellow Sea and East China Sea LMEs through support for the China GLOBEC II EYSEC presently supported by nine academic institutions and 100 scientists. The Committee encourages the complimentarity of this effort, and takes note of a similar linkage between the Benguela LME project and the studies underway in BENEFIT, GLOBEC/SPACC, ENVIFISH and VIBES programmes.

8. It is recommended that the IOC Secretariat take note of the complimentarity between GEF supported LME projects and more fundamental large-scale marine science research underway or planned, and foster collaboration through appropriate consultations with principal coordinators, investigators, and participating institutions.

9. Meeting participants noted that significant overlap exists between the objectives of the LME monitoring and assessment projects and the regional coastal observing systems being developed through GOOS. Participants also noted that LME projects have been included as pilot projects for LMR-GOOS. Coordination between GOOS and LMEs should be strengthened in order to avoid duplication of effort, and to ensure that where pertinent LMEs are integrated in the developing GOOS framework.

10. The Committee was pleased to learn that FAO would be serving as the Executive Agency for the GEF Block B proposal for the Canary Current LME project. It recommended that FAO distribute draft copies of the proposal to the participating countries (Guinea-Bissau, Guinea, Cape Verde, The Gambia, Senegal, Mauritania and Morocco), inviting comments on the full content of the draft, to be completed by the countries not later than 1 September 2000.

11. The GEF places priority on changing sectoral policies and activities responsible for the root causes of trans-boundary environmental problems. To ensure that new practices and activities are balanced and integrated, it is recommended that countries participating in LME projects ensure that science-based assessments of ecosystem productivity, fish and fisheries, pollution and ecosystem health are appropriately integrated with socioeconomic and governance considerations leading to the long-term sustainability of marine ecosystems.

12. The Committee, taking into account the successful completion of the first phase of the Guinea Current project is pleased to fully endorse the planing and implementation of the second phase of the Guinea Current project, and will take actions to encourage its initiation as soon as possible.

13. The Committee was pleased to learn of the approval by the GEF Council of funding for the initiation and implementation of the Yellow Sea LME project and Benguela Current LME project. Assistance will be provided to the participating countries, as needed, to assist in expediting the start-up dates with the pertinent UN agencies.

14. The Committee, taking note of the excellent presentations by Dr. Serra and Dr. Ngusari, is pleased to endorse the proposals for Block B grants for the Humboldt Current, Somali Current and Agulhas Current LMEs.

15. The Committee takes note that the GEF Council passed a resolution in May 2000

awarding a privileged status to UNIDO and FAO as executing Agencies of extended opportunities.

16. The Committee was pleased to learn that SimCoast would be made more widely available as an important decision making tool for the management of LME projects.

17. The Committee noted with satisfaction the strong capacity-building elements in marine science and technology that have been incorporated into the Yellow Sea, the Baltic, the Bay of Bengal, the Gulf of Guinea and Benguela Current LME Projects.

18. The Committee, recognizing the unique role the ACC Subcomittee on Oceans and Coastal Areas (ACC-SOCA) plays in coordinating marine-related efforts among UN specialized agencies, recommended that ACC-SOCA should take note of the growing number of LME projects among UN Member States, and to assist in coordinating the UN agencies involved, and promoting the LME approach within the UN system.

ANNEX I

AGENDA

IOC/IUCN/NOAA LME Consultative Meeting
13-14 June, 2000
UNESCO/IOC
Paris, France

Co-Chairs – P. Bernal/K. Sherman

Monday 13 June

TIME	TOPIC	LEADER
0900	Greetings IOC	P. Bernal/N. Cyr
	Update on LME Activity	K. Sherman/J. Waugh
	GIWA	U. Svensson
	Yellow Sea Update	Q. Tang
1230	LUNCH	
	General Discussions to Cover the Following topics:	
1400	Biomass Restoration/Human Dimensions	K. Sherman/T. Grigalunas
	3rd Global Fisheries Congress	Q. Tang
	Bay of Bengal/Canary Current update	Cooney/Cherif/Gueye
	North Atlantic Symposium	K. Sherman
	North Sea update	J. McGlade
	UNIDO Perspective	Z. Cziser
	GOOS/LMEs	N. Cyr
1800	ADJOURN	

Tuesday 14 June

TIME	TOPIC	LEADER
0900	Baltic LME/ICES update	J. Thulin
	Somali Current/Agulhas Current update	K. Sherman
	Eutrophication	K. Sherman
	Marine Protected Areas	J. Waugh
	Guinea Current/Benguela Current update	C. Ibe/Z. Cziser/M.O'Toole
	PDF B; TDA; SAP	
	South China Sea update	K. Sherman
	Xiamen, Bohai, FT/CZ/LME	
1230	LUNCH	
1400	Humboldt Current LME update	R. Serra
	LME Map update/WWW update	K. Sherman
	LME Round Table Review and Planning Session, 2000-2001	Committee
1700	ADJOURN	

ANNEX II

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ANNEX III

ACCRA DECLARATION

ACCRA DECLARATION ON THE ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT OF THE LARGE MARINE ECOSYSTEM OF THE GULF OF GUINEA

The first meeting of the Ministerial Committee of the Gulf of Guinea Large Marine Ecosystem (GOG-LME) Project took place in Accra, Ghana, on 9th and 10th July 1998. The meeting was attended by the five Ministers with responsibility for the environment in Benin, Cameroon, Côte d'Ivoire, Ghana and Togo and the Director General/Chief Executive of the Federal Environmental Protection Agency of Nigeria.

Basing their deliberations on extensive and substantive preparations, the Committee of Ministers has adopted the *Accra Declaration on Environmentally Sustainable Development of the Large Marine Ecosystem of the Gulf of Guinea.*

PREAMBLE

We, the Ministers of Environment of Benin, Cameroon, Côte d'Ivoire, Ghana and Togo and the Director General/Chief Executive of the Federal Environmental Protection Agency of Nigeria responsible for the GOG-LME Project,

Conscious of the fundamental importance of the health of the Gulf of Guinea Large Marine Ecosystem, including its coastal areas, to the well-being of the coastal communities, the economies and food security of the coastal states and the sociocultural life of the Gulf of Guinea Region;

Recognising the trans-boundary nature of the marine environmental and living resource management problems confronting the Gulf of Guinea Region;

Concerned about the severe rates of coastal erosion, the threat of flooding, the seriousness of pollution, loss of biological diversity and depletion of fishery resources;

Conscious of the necessity to adopt a standardised regional approach in a cooperative effort to their control;

Conscious of the importance of having the means to combat the problem of coastal erosion;

Convinced of the validity of the integrated and sustainable management of the Large Marine Ecosystem to the resolution of problems, Including strengthening regional cooperation and development, as well as establishing proper linkages between local, national, regional and global decision-making, and which is in fact unachievable without these said linkages;

Aware of the need to strengthen project implementation and to integrate more countries bordering the Guinea Current Large Marine Ecosystem and the necessity to enlarge the partnership notably with the inclusion of the private sector and other bilateral and multilateral donors;

Believing, therefore, that regional networking is an essential component of the system of ocean and coastal governance for the next century and beyond;

Noting and fully supporting the important achievement by the UNDP-GEF funded GOG-LME Project over the past three years, in the context of project execution by the project countries assisted by UNIDO, UNEP and US-NOAA, especially in forging a regional approach to ecosystem management;

Cognisant of the coming into force of the UN Conventions on the Law of the Sea, of the Framework Convention on Climate Change, of the Biodiversity Convention and the Abidjan Convention on Cooperation for the Protection and Development of Marine and the Coastal Zones of West and Central Africa (WACAF, 1981);

Determined to prevent, control and reduce coastal and marine environmental degradation in our respective countries with a view to improving living conditions and productivity;

DECISIONS

Have agreed that:

- The countries within the Gulf of Guinea should as soon as possible, establish appropriate institutional mechanisms for the planning, implementation - and evaluation of Integrated Coastal Areas Management (ICAM) plans;

- Management plans and strategies, which may vary from country to country, should follow general guidelines adopted at the regional level. They should balance economic development with environmental protection and living resources conservation concerns and harmonise long-term ecosystem requirements with short-term political and economic interests;

- Efforts shall be made to initiate, encourage and work synergistically with current and/or national and international programmes on integrated coastal zone management in the region. The national concerns of flooding, and pollution caused by hydrocarbons, toxic chemical products, fisheries productivity and over-exploitation and, above all, coastal erosion call for the special attention of donors;

- Data and information networking between the GOG-LME countries should be improved. National and regional databases on the coastal and marine environment should be established using the Geographical Information System (GIS) to support decision-making, to be available to all users;

- Transfer of knowledge and experiences among the countries of the GOG-LME, through the consolidation of networks for joint monitoring, research and capacity building in the field of marine environmental and natural resource management, should be enhanced;

- Adequate and timely material and financial resources should be provided by Our Governments with support from UNDP/GEF, UNIDO as well as our private sector, bilateral and multilateral partners to the GOG-LME Project to ensure its efficient implementation and harmonious development;

- Implementation of programmes should be monitored and rigorous, and objective evaluations should be conducted on a periodic basis to determine the effectiveness of programmes and the efficiency of the system in achieving the goals and objectives of the GOG-LME Project;

- The existing networks of non-governmental organisations (NGOs) in and among countries should be consolidated and expanded to ensure efficient and effective grassroots community involvement and information dissemination;

- The development of a Strategic Action Plan including a full Trans-boundary Diagnostic Analysis leading to the second phase of the project to include all the countries bordering the Guinea Current Large Marine Ecosystem, should be accelerated.

[Signed by The Gulf of Guinea Large Marine Ecosystem Committee of Ministers of Environment, Accra, Ghana, the 10th of July 1998]

ANNEX IV

LIST OF ACRONYMS

ACC-SOCA	UN Advisory and Consultative Committee Subcommittee on Oceans and Coastal Areas
BCC	Benguela Current Commission
BCLME	Benguela Current LME
BENEFIT	Benguela Environment and Fisheries Training Programme
BOBC	Committee for the Development and Management of Fisheries in the Bay of Bengal
BOBP	Bay of Bengal Programme
GIS	Geographical Information System
GIWA	Global International Waters Assessment
GLOBEC	Global Ocean Ecosystem Dynamics Programme
GOG-LME	Gulf of Guinea Large Marine Ecosystem Programme
GOOS	Global Ocean Observing System
HCLME	Humboldt Current Large Marine Ecosystem
IBCC	Interim Benguela Current Commission
IBSFC	International Baltic Sea Fisheries Commission
ICAM	Integrated Coastal Area Management
IMS	Institute of Marine Sciences of Tanzania
IOC	Intergovernmental Oceanographic Commission
IUCN	World Conservation Union
JGOFS	Joint Global Ocean Flux Study
LME/HDG	LME Human Dimensions Group
LMR-GOOS	Living Marine Resources Module of GOOS
MPA	Marine Protected Area
NGO	Non-governmental organisation
NOAA	US Department of Commerce National Oceanic and Atmospheric Administration
PCU	Programme Coordinating Unit of the Benguela Current Commission
SAP	Strategic Action Programme
TDA	Trans-boundary Diagnostic Analysis
TEST	Transfer of Environmentally Sound Technologies Programme of UNIDO
UNCLOS	United Nations Convention on the Law of the Sea
UNIDO	UN Industrial Development Organization
WACAF	Convention on Cooperation for the Protection and Development of Marine and the Coastal Zones of West and Central Africa
WHOI	Woods Hole Oceanographic Institution

In this Series, entitled

Reports of Meetings of Experts and Equivalent Bodies, which was initiated in 1984 and which is published in English only, unless otherwise specified, the reports of the following meetings have already been issued:

1. Third Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
2. Fourth Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans S. Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' ***(Also printed in Spanish)***
4. First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
5. First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
6. First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
7. First Session of the Joint CCOP(SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
8. First Session of the IODE Group of Experts on Marine Information Management
9. Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
10. Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
11. First Session of the IOC Consultative Group on Ocean Mapping ***(Also printed in French and Spanish)***
12. Joint 100-WMO Meeting for Implementation of IGOSS XBT Ships-of-Opportunity Programmes
13. Second Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
14. Third Session of the Group of Experts on Format Development
15. Eleventh Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
16. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
17. Seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and lntercalibration
18. Second Session of the IOC Group of Experts on Effects of Pollutants
19. Primera Reunión del Comité Editorial de la COI para la Carta Batimétrica lnternacional del Mar Caribe y Parte del Océano Pacífico frente a Centroamérica ***(Spanish only)***
20. Third Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
21. Twelfth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
22. Second Session of the IODE Group of Experts on Marine Information Management
23. First Session of the IOC Group of Experts on Marine Geology and Geophysics in the Western Pacific
24. Second Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources ***(Also printed in French and Spanish)***
25. Third Session of the IOC Group of Experts on Effects of Pollutants
26. Eighth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
27. Eleventh Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans ***(Also printed in French)***
28. Second Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
29. First Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
30. First Session of the IOCARIBE Group of Experts on Recruitment in Tropical Coastal Demersal Communities ***(Also printed in Spanish)***
31. Second IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
32. Thirteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asia Tectonics and Resources
33. Second Session of the IOC Task Team on the Global Sea-Level Observing System
34. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
35. Fourth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
36. First Consultative Meeting on RNODCs and Climate Data Services
37. Second Joint IOC-WMO Meeting of Experts on IGOSS-IODE Data Flow
38. Fourth Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
39. Fourth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
40. Fourteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
41. Third Session of the IOC Consultative Group on Ocean Mapping
42. Sixth Session of the Joint IOC-WMO-CCPS Working Group on the Investigations of 'El Niño' (***Also printed in Spanish)***
43. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
44. Third Session of the IOC-UN(OALOS) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
45. Ninth Session of the IOC-UNEP Group of Experts on Methods, Standards and lntercalibration
46. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
47. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
48. Twelfth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
49. Fifteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
50. Third Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
51. First Session of the IOC Group of Experts on the Global Sea-Level Observing System
52. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean
53. First Session of the IOC Editorial Board for the International Chart of the Central Eastern Atlantic ***(Also printed in French)***
54. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico ***(Also printed in Spanish)***
55. Fifth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
56. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
57. First Meeting of the IOC *ad hoc* Group of Experts on Ocean Mapping in the WESTPAC Area
58. Fourth Session of the IOC Consultative Group on Ocean Mapping

59. Second Session of the IOC-WMO/IGOSS Group of Experts on Operations and Technical Applications
60. Second Session of the IOC Group of Experts on the Global Sea-Level Observing System
61. UNEP-IOC-WMO Meeting of Experts on Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change
62. Third Session of the IOC-FAO Group of Experts on the Programme of Ocean Science in Relation to Living Resources
63. Second Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
64. Joint Meeting of the Group of Experts on Pollutants and the Group of Experts on Methods, Standards and Intercalibration
65. First Meeting of the Working Group on Oceanographic Co-operation in the ROPME Sea Area
66. Fifth Session of the Editorial Board for the International Bathymetric and its Geological/Geophysical Series
67. Thirteenth Session of the IOC-IHO Joint Guiding Committee for the General Bathymetric Chart of the Oceans ***(Also printed in French)***
68. International Meeting of Scientific and Technical Experts on Climate Change and Oceans
69. UNEP-IOC-WMO-IUCN Meeting of Experts on a Long-Term Global Monitoring System
70. Fourth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
71. ROPME-IOC Meeting of the Steering Committee on Oceanographic Co-operation in the ROPME Sea Area
72. Seventh Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' ***(Spanish only)***
73. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico ***(Also printed in Spanish)***
74. UNEP-IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs
75. Third Session of the IODE Group of Experts on Marine Information Management
76. Fifth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
77. ROPME-IOC Meeting of the Steering Committee for the Integrated Project Plan for the Coastal and Marine Environment of the ROPME Sea Area
78. Third Session of the IOC Group of Experts on the Global Sea-level Observing System
79. Third Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
80. Fourteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
81. Fifth Joint IOG-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
82. Second Meeting of the UNEP-IOC-ASPEI Global Task Team on the Implications of climate Change on Coral Reefs
83. Seventh Session of the JSC Ocean Observing System Development Panel
84. Fourth Session of the IODE Group of Experts on Marine Information Management
85. Sixth Session of the IOC Editorial Board for the International Bathymetric chart of the Mediterranean and its Geological/Geophysical Series
86. Fourth Session of the Joint IOC-JGOFS Panel on Carbon Dioxide
87. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Pacific
88. Eighth Session of the JSC Ocean Observing System Development Panel
89. Ninth Session of the JSC Ocean Observing System Development Panel
90. Sixth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
91. First Session of the IOC-FAO Group of Experts on OSLR for the IOCINCWIO Region
92. Fifth Session of the Joint IOC-JGOFS CO, Advisory Panel Meeting
93. Tenth Session of the JSC Ocean Observing System Development Panel
94. First Session of the Joint CMM-IGOSS-IODE Sub-group on Ocean Satellites and Remote Sensing
95. Third Session of the IOC Editorial Board for the International Chart of the Western Indian Ocean
96. Fourth Session of the IOC Group of Experts on the Global Sea Level Observing System
97. Joint Meeting of GEMSI and GEEP Core Groups
98. First Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
99. Second International Meeting of Scientific and Technical Experts on Climate Change and the Oceans
100. First Meeting of the Officers of the Editorial Board for the International Bathymetric Chart of the Western Pacific
101. Fifth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
102. Second Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
103. Fifteenth Session of the Joint IOC-IHO Committee for the General Bathymetric Chart of the Oceans
104. Fifth Session of the IOC Consultative Group on Ocean Mapping
105. Fifth Session of the IODE Group of Experts on Marine Information Management
106. IOC-NOAA *Ad hoc* Consultation on Marine Biodiversity
107. Sixth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
108. Third Session of the Health of the Oceans (HOTO) Panel of the Joint Scientific and Technical Committee for GLOSS
109. Second Session of the Strategy Subcommittee (SSC) of the IOC-WMO-UNEP Intergovernmental Committee for the Global Ocean Observing System
110. Third Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
111. First Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate
112. Sixth Session of the Joint IOC-JGOFS C02 Advisory Panel Meeting
113. First Meeting of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS)
114. Eighth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of "El Niño" ***(Spanish only)***
116. Second Session of the IOC Editorial Board of the International Bathymetric Chart of the Central Eastern Atlantic ***(Also printed in French)***
116. Tenth Session of the Off ices Committee for the Joint IOC-IHO General Bathymetric Chart of the Oceans (GEBCO), USA, 1996
117. IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Fifth Session, USA, 1997
118. Joint Scientific Technical Committee for Global Ocean Observing System (J-GOOS), Fourth Session, USA, 1997
199 First Session of the Joint 100-WMO IGOSS Ship-of-Opportunity Programme Implementation Panel, South Africa, 1997
120. Report of Ocean Climate Time-Series Workshop, Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate, USA, 1997

121. IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional Global Ocean Observing System (NEAR-GOOS), Second Session, Thailand, 1997

122. First Session of the IOC-IUCN-NOAA *Ad hoc* Consultative Meeting on Large Marine Ecosystems (LME), France, 1997

123. Second Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), South Africa, 1997

124. Sixth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico, Colombia, 1996 ***(also printed in Spanish)***

125. Seventh Session of the IODE Group of Experts on Technical Aspects of Data Exchange, Ireland, 1997

126. IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), First Session, France, 1997

127. Second Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LME), France, 1998

128. Sixth Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1997

129. Sixth Session of the Tropical Atmosphere - Ocean Array (TAO) Implementation Panel, United Kingdom, 1997

130. First Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), France, 1998

131. Fourth Session of the Health of the Oceans (HOTO) Panel of the Global Ocean Observing System (GOOS), Singapore, 1997

132. Sixteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), United Kingdom, 1997

133. First Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1998

134. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean (IOC/EB-IBCWIO-IW3), South Africa, 1997

135. Third Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), France, 1998

136. Seventh Session of the Joint IOC-JGOFS C02 Advisory Panel Meeting, Germany, 1997

137. Implementation of Global Ocean Observations for GOOS/GCOS, First Session, Australia, 1998

138. Implementation of Global Ocean Observations for GOOS/GCOS, Second Session, France, 1998

139. Second Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Brazil, 1998

140. Third Session of IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS), China, 1998

141. Ninth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño', Ecuador, 1998 ***(Spanish only)***

142. Seventh Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series, Croatia, 1998

143. Seventh Session of the Tropical Atmosphere-Ocean Array (TAO) Implementation Panel, Abidjan, Côte d'lvoire, 1998

144. Sixth Session of the IODE Group of Experts on Marine Information Management (GEMIM), USA, 1999

145. Second Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), China, 1999

146. Third Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Ghana, 1999

147. Fourth Session of the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC); Fourth Session of the WCRP CLIVAR Upper Ocean Panel (UOP); Special Joint Session of OOPC and UOP, USA, 1999

148. Second Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1999

149. Eighth Session of the Joint IOC-JGOFS CO2 Advisory Panel Meeting, Japan, 1999

150. Fourth Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional – Global Ocean Observing System (NEAR-GOOS), Japan, 1999

151. Seventh Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1999

152. Sixth Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), France, 1999

153. Seventeenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), Canada, 1999

154. Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y el Golfo de Mexico (IBCCA), Septima Reunión, Mexico, 1998

IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA), Seventh Session, Mexico, 1998

155. Initial Global Ocean Observing System (GOOS) Commitments Meeting, IOC-WMO-UNEP-ICSU/Impl-III/3, France, 1999

156. First Session of the *ad hoc* Advisory Group for IOCARIBE-GOOS, Venezuela, 1999 ***(also printed in Spanish)***

157. Fourth Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), China, 1999

158. Eighth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series, Russian Federation, 1999

159. Third Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), Chile, 1999

160. Fourth Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS). Hawaii, 2000

161. Eighth Session of the IODE Group of Experts on Technical Aspects of Data Exchange, USA, 2000

162. Third Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LME), France, 2000