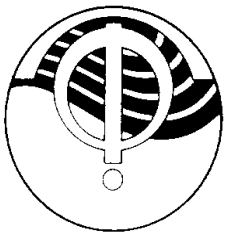
Intergovernmental Oceanographic Commission
Annual Reports Series



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INTRODUCTION

The Intergovernmental Oceanographic Commission (IOC) was set up by UNESCO in 1960 to develop, recommend and co-ordinate international programmes for the scientific investigation of the oceans and to provide related ocean services to Member States (currently over 125). The membership is open to A*any Member State of any one of the organizations of the United Nations System*@. The Member States constitute the IOC Assembly - the Governing Body.

The rationale for IOC was stated clearly at the time:

> AThe oceans, covering some 70% of the earth=s surface, exert a profound influence on mankind and even on all forms of life on Earth... In order to properly interpret the full value of the oceans to mankind, they must be studied from many points of view. While pioneering research and new ideas usually come from individuals and small groups, many aspects of oceanic investigations present far too formidable a task to be undertaken by any one nation or even a few nations@.

Within the United Nations, IOC alone has the responsibility for basic oceanographic research. A functionally autonomous body within UNESCO, IOC collaborates with other organizations within and outside the United Nations system, especially the United Nations Environment Programme (UNEP); the International Maritime Organization (IMO); the International Atomic Energy Agency (IAEA); The United Nations Food and Agriculture Organization (FAO); the World Meteorological Organization (WMO); the International Council of Scientific Unions (ICSU); and with other international programmes within UNESCO, such as the International Hydrographic Programme (IHP); the Man and the Biosphere Programme (MAB); the International Geological Correlation Programme (IGCP); and the Social Sciences Management of Social Transformations Programme (MOST).

IOC is recognized as a competent international organization in the content of marine scientific research within the United Nations Convention on the Law of the Sea. The IOC also provides scientific advice to the parties to the UN Convention of Climate Change and to the UN Convention on Biological Diversity and contributes to the objectives of the International Decade for Natural Disaster Reduction (1990-1999). IOC, in collaboration with UNEP provides scientific and technical advice to the Member States concerned with the proper management and sustainable development of the coastal zone.

Today, IOC focuses on 4 major themes:

- *international oceanographic research programmes* that aim to improve our understanding of critical global and regional ocean processes and their relationship to sustainable development and management of ocean resources. Among them, those related to oceans and climate (such as the El Niño studies and World Climate Research Programme), to ocean science in relation to living and non-living resources, and also the global investigation of pollution in the marine environment are worth being specially mentioned;

- *co-ordinating a global ocean observing* system to provide information needed for:

    - oceanic and atmospheric forecasting;
    - ocean and coastal zone management by coastal nations;
    - research into global environment change.

The IOC=s Global Ocean Observing System (GOOS) is one of the global observing systems being set up after the United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, 1992. It also contributes to the UNEP Global Earth Monitoring system (GEMS) and is a part of the United Nations EARTHWATCH. The observing system will incorporate existing subsystems for the global collection of temperature and salinity data from the upper levels of the ocean (IGOSS), for global sea-level monitoring (GLOSS) and for currents observations with the help of drifting buoys (DBCP).

- *educational and training programmes and technical assistance* essential for marine research and systematic observations of the global ocean and its coastal zone, especially in developing countries. The implementation of this theme is achieved through the promotion of training, education and mutual assistance (TEMA), the marine sciences, consisting principally of training courses, provision of equipment to less technically developed Member States, support for scientists from those countries to enable them to participate in major marine science conferences and the publication of methodological materials. The important component of these activities is increasing public awareness of the role of the oceans in human life and of the effect of human activities on the oceans. For this reason, the IOC is playing a leading role in the UN 1998 International Year of the Ocean.

- *efficient and widespread sharing of ocean data* from research, observation and monitoring. To facilitate programme development, co-ordination, data acquisition and dissemination of data and information products, the IOC has developed a number of global services, among them the unique system of oceanographic data

centers embraced by the IOC programme on International Oceanographic Data Information Exchange (IODE). This programme forms the backbone of 2 closely related sub-programmes on oceanographic data and information management. Ocean mapping and natural disaster reduction projects are also included under this theme.

To achieve coherent and effective implementation of the programme activities under all themes, the IOC relies upon the active participation of the Member States marine scientific and technical research institutions in developing and developed countries. To promote participation, the IOC has created regional subsidiary bodies in all those ocean regions that were lacking appropriate regional ocean organizations. Today, there are 7 IOC regional subsidiary bodies to promote specific regional studies in the context of the IOC=s major programme for the Black Sea, IOCINDIO and IOCINCWIO, IOCARIBE, IOCEA, SOC and WESTPAC.

A. IMPLEMENTATION OF IOC GOVERNING BODIES RESOLUTIONS

1. RESOLUTIONS ADOPTED BY THE NINETEENTH SESSION OF THE IOC ASSEMBLY

Resolution XIX-1: Fourth Session of the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB)

The Resolution XVIII-8 of the Eighteenth Session of the Assembly has been fully implemented. The staffing situation for the HAB and OSLR programmes has improved during 1997 with the arrival of a Danish Associate expert for HAB and a senior oceanographer seconded by the USA for the OSLR programme overall. The Fourth Session of IPHAB was successfully completed in Vigo, Spain, June-July 1997, at the new HAB Centre stationed in the Spanish National Institute of Oceanography, Vigo, Spain. The session of the Panel was held back-to-back with the International Symposium on plankton blooms.

The implementation of Resolution XIX-1 is proceeding on schedule. The HAB programme is going very well. The recommendations of the Fourth Session of IPHAB are being implemented. The regional activities are developing well, the training courses are on track and the agreed workshops and seminars are proceeding. The available financial resources for the programme are reasonable. However, more funds are needed for a strengthened regional implementation, in particular, in Africa and South America. Such resources are being sought through project proposals.

The HAB programme is related and provides input to the development of GOOS and other elements of OSLR, e.g. the Global Coral Reef Monitoring Network. Interactions and coordination are also on line with the GIPME programme, e.g. in relation to the ballast water disposal problem, and the input of nutrients from land-based activities.

The Fifth Session of IPHAB will be held in Paris, June 1999, before the Twentieth Session of the IOC Assembly.

Resolution XIX-2: Ocean Science in Relation to Non-Living Resources (OSNLR)

The OSNLR programme is in a transition phase. It needs to be renewed and possibly take on other challenges than the coastal zone problems which have been in the programme=s focus for about 5 years. Several products have resulted from this effort, e.g. the Conference in Bordeaux on Coastal Change in 1995; several volumes relevant to coastal zone management problems for Africa, the Caribbean, Northern Indian Ocean, WESTPAC; several technical manuals on coastal zone studies and observations. The programme has been closely linked to the gradual development of a dedicated coastal zone programme of IOC. This includes also other elements quite outside of OSNLR, such as the COASTS programme.

A consultation on the OSNLR renewal was held, in accordance with the Resolution, in Paris, 1-3 December 1997. This resulted in the identification of several potential avenues of renewal of OSNLR.

Resolution XIX-3: Ocean Mapping

The Ocean Mapping programme is a cooperative endeavour with the IHO. The programme is proceeding very well. This is due, to a large extent, to the secondment by Russia of a senior ocean mapping expert to the IOC Secretariat. Without this the programme implementation would not have proceeded as is now the case. Activities are pursued in all the IOC regions. A new activity has been initiated in the Arctic Ocean, in accordance with the instructions in the Resolution. Meetings of the editorial boards are organized in a scheduled fashion. Financial resources are obtained to the IOC Trust Fund from USA, France, Russia and Germany. Consultations in UNESCO with respect to obtaining a dedicated UNESCO post for the Ocean Mapping programme in the IOC Secretariat have not resulted in any movements. It does not appear likely to happen during the coming biennium, in view of the austerity measures in UNESCO and other priorities. Thus the present situation will remain, with partial coverage of the seconded senior assistant secretary from the IOC Trust Fund and other sources, besides the Russian funds. Coordination is being maintained with SCOR as regards the scientific requirements for detailed bathymetry of the ocean floor. The report of the SCOR Working Group will represent an important input to the Ocean Mapping programme.

Resolution XIX-4: Restructuring of the GIPME Programme

The GIPME programme suffers from the fact that the position of a senior assistant secretary in charge of the programme in the IOC Secretariat has been vacant for the last 3 years. This is due to the prolonged recruitment processes in UNESCO. Thanks to the support of the Chairman of the GIPME Committee from USA, working closely

with a part-time consultant in the IOC Secretariat, the programme is progressing. The restructuring, decided through the Resolution, has been implemented and the joint IOC-UNEP panel was abolished. National experts involved in the GIPME programme have been contacted. The inter-agency coordination and cooperation, involving IOC, UNEP, IMO and IAEA is functioning well. Several joint activities are continuously underway, in particular, the joint Marine Environment Studies Laboratory at the IAEA Marine Laboratory in Monaco. This is financially supported by IOC, besides IAEA, as the major contributor, and UNEP. The GIPME programme also interacts closely with GOOS, OSLR-HAB and the emerging integrated coastal programme of IOC.

Resolution XIX-5: Marine Science and Observation inputs to ICAM

Since UNCED 1992 an effort has been made to develop coastal zone studies and inputs to management as a part of several IOC programmes. It has become clear that coordination and integration are required, and the Resolution endeavours to address this need. In addition, the interdisciplinary aspects are considered. In the IOC programme, this is catered for, *inter alia*, through cooperation with other UNESCO activities and with other organizations, in particular, UNEP and ICSPRO Agencies.

In accordance with the Resolution, a coordinator has been appointed in the IOC Secretariat as a part of the structure, contributions from existing programmes identified and a dedicated programme specified.

Through the ACC Sub-Committee on Oceans and Coastal Areas and the ICSPRO mechanisms, other Agencies and programmes are invited to cooperate with IOC. This is particularly focused on the regional perspective and programmes of the IOC regional subsidiary bodies.

Several activities are planned to test the approach and identify further needs. This is part of the 1998 International Year of the Ocean programme. All the core programmes of the IOC are contributing to the coastal zone programme. It is important that the international coordination be matched at the national level.

Resolution XIX-6: Third Session of the Intergovernmental Committee for the Global Ocean Observing System (I-GOOS)

In 1997 several actions have occurred which have put the GOOS development at a high intensity level: the UNESCO post of the Director of the GOOS Project Office was filled; a senior programme officer was seconded to the Office; the scientific and technical planning was nearing completion for the first phase; several regional GOOS components were established, albeit some on a pilot scale; the structure of the GOOS governance was streamlined; coordination with GCOS, GTOS and CEOS was firmly structured at the inter-agency level; Member States were gradually becoming aware of, and committed to, GOOS. This should probably also be seen as a result of the increasing concern for the marine environment during the last 2-3 years.

The implementation of the Resolution is accordingly proceeding on schedule. The MED-GOOS was launched at the Workshop in Malta, November 1997; other regional activities have been launched or firmly associated with GOOS, such as TOGA-TAO and the PIRATA array in the Atlantic; the coastal and living marine resources modules planning panels have been established; the GODAE is proceeding; the First GOOS Agreement meeting is planned on schedule; actions are underway for studies of costs and benefits of GOOS. Several of the IOC core programmes are contributing to the GOOS development. Thus considerable resources of the IOC are provided to support GOOS. Despite this, the resource situation is not satisfactory. Further contributions are required from Member States to the IOC Trust Fund for GOOS. In view of UNESCO priorities being very different from those of GOOS, the contribution from the UNESCO regular programme funds is quite limited. Satisfactory implementation of GOOS requires direct inputs from Member States also towards the international part of GOOS management. Information about GOOS is being persistently circulated and possibilities are used to present elements of GOOS, such as the on-line presentation of IGOSS at the 3rd COP for UNFCCC in Kyoto, Japan, December 1997.

Resolution XIX-7: GOOS Capacity Building

The GOOS capacity building is proceeding at different levels. Several workshops have been held which have sensibilized regions to GOOS and initiated national actions. These included the IOCINDIO, IOCINCWIO, WESTPAC and Mediterranean regions. Similar activities are planned for the Pacific, Caribbean and South America in 1998.

Provision of support from developed countries to developing countries is forthcoming at the regional level. Examples are: Eastern Europe and South America, parts of Africa, parts of North East and South East Asia. Clearly, these developments take time, but a steady progress is noted. This is very encouraging. The association of IOC with EURO-GOOS is broadening and this also serves the GOOS capacity building in a noteworthy positive direction. Thus, the Resolution is being gradually implemented.

Resolution XIX-8: Global Sea-Level Observing System (GLOSS)

GLOSS is a firmly established system of sea-level observations providing inputs to coastal zone protection and management, various assessments of potential impacts of changes on coastal areas and small island developing states, e.g. in relation to climate, storm surges, coastal flooding, and regional evaluations of variabilities. The establishment of absolute sea-level benchmarks is underway, as well as the mapping with bathymetry and coastal morphology of particularly vulnerable areas. Training in sea-level observations and analysis is provided regularly. Cooperation between PSMSL and IOC works out very well, and the importance of such institutions as PSMSL for a global service as important as the sea-level network is proven beyond doubt.

The Resolution is being fully implemented. A new coordinator (Technical Secretary) for GLOSS was identified in the GOOS Project Office and the revised GLOSS Implementation Plan was published as the IOC Technical Series No. 50. The role of regional coordinators is being gradually strengthened through the IOC regional subsidiary bodies and the related cooperative mechanisms. GLOSS is closely coordinated with GOOS, and it is an essential part of GOOS while also serving other needs.

Resolution XIX-9: IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)

The IOCARIBE Action Plan and Programme adopted at IOCARIBE-V, Barbados, December 1995, is being gradually implemented. Restructuring aimed at a broader involvement of Member States in the IOCARIBE actions than was previously the case. Regular consultations between the IOCARIBE Officers, the Secretariat and the national action addresses are hold. Networks of programme contacts are developed and supported from the Secretariat.

Consultations in UNESCO have shown that there will be no additional posts for the IOC/IOCARIBE. This can only be achieved by using the existing IOC posts upon retirements. Thus, the accepted plan is to provide a P-4 post to IOCARIBE in 1998, using one of the P-5 retirements from the IOC Secretariat. This is the aim, and we hope that it will be accepted by the UNESCO administration.

There is a strong need to obtain more support for IOCARIBE from the Member States of the region. Without their strengthened interest and support the full potential of IOCARIBE will not materialize. It is the aim of the efforts of the IOCARIBE Officers and the Secretariat to generate such increased support. The regional cooperation is maintained, although there is a clear weakening compared to the situation several years ago.

Resolution XIX-10: Fourth Session of the IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean (IOCINCWIO-IV)

The Regional Committee met in Mombasa, Kenya , May 1997, and adopted an ambitious programme. This Regional Committee has developed and strengthened during the 90's, due partly to the support of several donors, in particular, of Sweden and Belgium. This long-term ensured support made it possible to maintain a sustained, steady programme implementation at the level appropriate for the regional capacity. The national institutions have been gradually strengthened and the staff supported through individual research and study grants. This, together with the sandwich training programme developed and supported by the donors, has implied that qualified staff has been maintained at the institutions and has become involved in the regional programme.

Several important activities are planned for 1998. Cooperation with bi- and multi-lateral programmes supported by Sweden and the EU through the Commission Ocean Indien is being strengthened. A regional symposium involving small island developing states is being planned for 1998. PACSICOM will imply an increasing global interest in the region. The HAB programme has prepared a project specification for a regional HAB action. Additional funds are being sought for this activity and for PACSICOM. The baseline studies of coastal erosion and nutrient levels have started The LME programme is being specified and the GCRMN mode is put in place. Close cooperation is sought with the UNEP Regional Sea Nairobi Convention and its Secretariat in the Seychelles.

The Resolution is being implemented on schedule.

Resolution XIX-11: IOC Regional Committee for the Central Indian Ocean

The Second Session of the Regional Committee was organized in Goa, India, November 1996. This was 8 years after the First Session (Islamabad, Pakistan, July 1988). The reason for this long interval is related to the developments and conditions in the regions. During the intersessional period a considerable part of the work plan agreed upon at the First Session was, however, carried out. At its Second Session the Committee reviewed the progress and the development in the region and formulated the new regional cooperation programme based on the identified regional priority needs. This programme is being gradually implemented. A supportive office and secretariat has been established at the Office of the Chair IOCINDIO, Dr Muthunayagam, Secretary DOD, in New

Delhi, India. The Government of India also provided support to the regional programme implementation through a donation to the IOC Trust Fund.

The planned workshops are developing as scheduled, and are closely coordinated with other related activities and mechanisms in the region. Cooperation with ROPME and PERSGA is well established. The Resolution is being gradually implemented.

The financial situation, however, needs to be improved. The region has considerably less funds than the IOCINCWIO region, due to the strong donor support for the latter. Member States are urged to consider ways and means of providing additional support to the IOCINDIO region.

Resolution XIX-12: Activities of the IOC Regional Committee for the Southern Ocean (IOCSOC)

Following the Session of the IOCSOC in Bremerhaven, Germany, June 1996, a specified programme was developed by correspondence and presented to the Assembly. The proposed programme actions for 1998-99 were approved. These are now being gradually implemented, subject to the availability of financial and human resources.

The Technical Secretary of IOCSOC in the IOC Secretariat retired in mid-1997. An interim substitution was identified. However, this situation led to some slow-down in the process. Cooperation and communication with other bodies active in the region are maintained.

The relevant activities are also closely linked to the IOC core programmes, e.g. GOOS, GIPME, WCRP and OSLR.

Resolution XIX-13: Matters related to the economic and social impacts of the Ocean/Atmosphere phenomenon El Nino and the Southern Oscillation (ENSO)

The impact of the current El Nino during part of 1997 was very considerable, despite the fact that it has been forecasted. The serious situation generated considerable action. In November the IOC fielded an expert mission to Indonesia, following a request from the Indonesian Government. The seriousness of the situation was brought out and several remedial measures were proposed. It was also suggested that a UNESCO House-wide initiative be launched. This is being considered.

The IOC Secretariat proposed, and the IOC Officers at their meeting in October 1997 endorsed this proposal, that a meeting be organized dedicated to the oceanographic aspects of the phenomenon, falling clearly within the IOC mandate. The meeting would address the current level of understanding and ability to forecast El Nino - ENSO, the use of the forecast, the need for producing forecasts, the gaps to be filled so as to improve the forecast as well as its use and application in various regions, but particularly in the Pacific. Other relevant bodies and partners were invited to co-sponsor such a meeting. It is being planned for Summer 1998. This would constitute a socio-economic study of the ENSO phenomenon.

The IOC was represented at the XII meeting of the scientific committee of ERFEN, Bogota, Colombia, 6-9 October 1997, and at the seminar on coordination of activities in the South East Pacific region convened by CPPS-IOC-WMO, Bogota, Colombia, 10-11 October 1997. At both occasions the current El Nino phenomenon was discussed, cooperative actions reviewed and agreed upon.

An inter-agency meeting was convened by the IDNDR Secretariat in Geneva, 17 November 1997, at which the plans of IOC and UNESCO were presented. The IOC plans were also presented to the informal IACCA consultations held during the Third COP of the UNFCCC, Kyoto, Japan, December 1997.

The IOC is also referred to in the Resolution on El Nino - ENSO and the social impacts thereof adopted by the General Assembly of the United Nations in December 1997. The IOC is endeavouring to follow this up, including through inter-agency mechanisms.

The Resolution is being gradually implemented. Member States are urged to support the initiatives and to provide support to the IOC-TF.

Resolution XIX-14: IOC Activities in the Caspian Sea

The IOC is not considered as the leading partner as regards the Caspian Sea activities within UNESCO. Despite this, the IOC took the lead early on with IAEA in supporting the development of an inter-agency programme to study the extremely complex Caspian Sea situation. This led to the endorsed inter-agency programme and the

acknowledgement of IHP as the leading partner in UNESCO. However, IOC is being still called upon for taking on the leading role. This can only be achieved in a credible fashion through the allocation of sufficient dedicated financial and human resources. These do not exist, and hence must be retained. In maintaining a close contact with potential partners one may possibility materialize to secure resources through the IOC association with the new GEF proposed project on the Caspian Sea. This will then build on the experiences obtained from the IOC involvement with the GEF-supported Black Sea Environmental Programme, which certainly provided a lot of guidance on how to proceed with a new project of this type.

The development is expected to take shape in early 1998. Until then, further development of specific proposals requested in the Resolution seems premature, since the inputs have been made so far to the potential GEF project through the involvement of the IOC. In light of this, the Resolution is being gradually implemented.

Resolution XIX-15: Resolution for DOSS-2

Following the acceptance of most elements of the interim report of DOSS-2 and the approval of the selected actions, the *ad hoc* Study Group met in October 1997 in Paris, to consider particularly the questions related to the revision of the IOC Statutes and the related Rules of Procedure. The second meeting is being planned for April 1998 in Paris.

The approved parts of the interim report, as specified in the Resolution, are being implemented in an organized and scheduled fashion.

Resolution XIX-16: Support for the Global Programme of Action for Protection of the Marine Environment from Land-Based Activities

Through the ACC Sub-Committee on Oceans and Coastal Areas, UNEP and other partner agencies have been informed about the Resolution.

Furthermore, IOC has corresponded with FAO and IMO offering its willingness to cooperate in the relevant parts of the implementation of the clearing house mechanism concerning nutrients, petroleum, hydrocarbons and marine debris (litter). Through the GIPME programme support has also been offered as regards methodological developments, standards, reference materials and training with respect to observations and inventories. The relevance of the mussel watch technique and programme to identify the hot-spots and areas of concern has also been pointed out and demonstrated through the on-going International Mussel Watch Programme. Through GIPME, GOOS, OSLR and the Coastal Programme additional contributions of the IOC to the GPA are being identified. The Resolution is being gradually implemented.

Resolution XIX-17: Synthesis-Assessment of Ocean Science

The IOC is associated with the GESAMP Marine Environment Assessment work, the Global International Water Assessment supported by GEF and the regional assessments being carried out for the implementation of the GPA-LBA. The contributions of the IOC to these efforts consist of the provision of experts, some limited financial support for meetings and participation in regional workshops. For the GESAMP-MEA and GPA-LBA work the IOC also provides the part-time services of an IOC consultant stationed in Nairobi so as to ensure inputs from the IOC regional bodies and their programmes.

In addition, the IOC is endeavouring to support the assessment work of the IPCC. This is done through the communication with the oceanography community, the identification of data sources and experts. Some specific IOC work is also directly linked to the IPCC work, e.g. the expert meetings on oceans and climate, WCRP, GOOS.

Certain specific actions have also been undertaken with respect to the scientific assessment. ICSU and SCOR are partners, and SCOR has identified its contact person. Consultations have been held with the IOC Officers as regards the joint advisory group.

Some actions planned for 1998 will also contribute to the step-wise assessment: a meeting on oceans and climate; a meeting on El Nino; the WOCE Symposium; the marine pollution symposium in Monaco; and possibly other actions.

The Resolution is being gradually implemented.

Resolution XIX-18: 1998 International Year of the Ocean

Throughout 1997 the preparations for 1998 International Year of the Ocean have intensified. The Deputy

Executive Secretary has been given the special responsibility for this effort. Resources have been made available from the IOC budget for the secretariat support, the preparation of the IOC Brochure, stickers and flags. The IOC has also provided substantial financial support for the UNESCO Press Kit which was released in mid-December.

The provisional programme and the objectives have been presented at several major events in 1997, including the Special Session of the United Nations= General Assembly (June 1997); the Summit of the Sea Conference (September 1997); the 29th session of the General Conference of UNESCO (November 1997). Through the ACC Sub-Committee on Oceans and Coastal Areas and ICSPRO, a close inter-agency cooperation and coordination is maintained. The IOC is contributing financially and substantially to the development of the electronic UN Ocean Atlas. A pilot project on this is expected to be presented in the UN Pavilion at EXPO=98. The IOC is also providing other substantive inputs to the Pavilion, with the emphasis on ocean research, observations and education.

Within UNESCO, we have made repeated efforts to seek the involvement of other sectors. Social Sciences, Education and OPI are involved in several dedicated activities, in addition to other programmes in the Science Sector. The provisional programme was presented to the Permanent Delegations at the theme session on 18 December 1997.

A considerable effort has been devoted to mobilizing and stimulating national programmes. This has met with some success. Contributions have been made to the international actions from individual Member States, e.g. the UK provided a number of flags and supported the printing of the IOC Brochure. Portugal supported the IOC >s association with the Pavilion of the Future at EXPO=98, presenting ocean forecasting.

The major problem has been to obtain sufficient support from UNESCO and Member States, since we have not been using the Regular Programme funds so far. Thus the IOC Secretariat has made very considerable efforts with respect to the instructions of the Resolution. The response has been very positive in several cases, but, unfortunately, this was not so in some important matters. The Resolution is, in any case, fully implemented as regards the IOC Secretariat.

Resolution XIX-19: IOC and UNCLOS

The IOC Secretariat maintains close linkages with the international structure and mechanisms of UNCLOS and endeavours to attend all the relevant meetings. We particularly address the specific responsibilities identified for IOC by UNCLOS. In addition, some of the other relevant provisions are being addressed, in accordance with the report of the open-ended Intersessional Working Group on IOC=s possible role in relation to UNCLOS, as endorsed by the Assembly.

The advisory mechanism in the form of an open-ended Advisory Body of Experts on the Law of the Sea (ABE-LOS), established by the Assembly, has been formed through nominations of experts from several Member States, following the invitation expressed in a circular letter from the Executive Secretary IOC. The Resolution is implemented.

Resolution XIX-20: Programme and Budget 1998-99

The proposed General Conference Resolution was transmitted to the General Conference by the Director-General. The IOC received a very strong support in the debate in Commission III of the General Conference. The provisional programme was endorsed in principle, as was the proposed resolution. The provisional programme for 1998 International Year of the Ocean, presented as a separate document, was also strongly supported. However, the IOC did not receive any additional posts, although some additional staffing funding has been made available The number of UNESCO posts is still at 22. This is certainly neither sufficient nor satisfactory.

The IOC programme for 1996-97 has been implemented to the extent possible within the existing resources. The plans for 1998-99 are presently being transformed into workplans, on the basis of the endorsement of the Assembly proposals by the 28th General Conference.

2. RESOLUTIONS ADOPTED BY THE TWENTY-NINTH SESSION OF THE EXECUTIVE COUNCIL

The implementation of these Resolutions during 1996 is summarized in the Annual Report 1996. Further implementation is reported on herein.

Resolution EC-XXIX.1: International Oceanographic Data and Information (IODE)

The IODE programme is a major core activity of IOC. Its progress is fully satisfactory, although resource

limitations continue to be a problem for a stronger implementation in developing countries. The value of, and the need for, an open and free data exchange is well acknowledged. However, the possible establishment of an agreement on intellectual property for databases is still being considered. This is being followed closely by the IODE. Regional development and association with GOOS are likewise fundamental for the programme impact. The rescue of existing data is still a major effort through GODAR.

The MIM part of IODE has taken on a new dimension through Internet and the IOC Homepage. This is being continuously developed thanks to very dedicated efforts by the concerned staff. The MIM actions are particularly important for the 1998 International Year of the Ocean programme implementation. Furthermore, video productions, interviews and briefings occur increasingly.

The IODE programme, adopted by IODE-XV and endorsed by the Executive Council, is being implemented according to the plan. Extrabudgetary resources are being received, and an increasing interest is noticeable among Member States.

Resolution EC-XXIX.2: International Tsunami Warning System in the Pacific (ITSU) and IDNDR-related matters

The Summary Report of the XVI Session of the International Coordination Group for the Tsunami Warning System in the Pacific (Chile, September 1997) will be presented to the Thirty-first Session of the Executive Council. The programme adopted at ITSU-XV in 1995 has been implemented. However, the interest in the tsunami warning system is increasing in the Caribbean, the Mediterranean and, possibly, in the Eastern Central Pacific regions. Linkages and coordination with the activities in other regions are being established and the experiences from the Pacific system are being utilized.

Other IDNDR-related matters in which IOC plays a major role concern storm surges and El Nino forecasting. The storm surge programme for the Bay of Bengal - Northern Indian Ocean - is being developed in cooperation with WMO. The GLOSS system is also an important element when it comes to coastal protection and hazard warning.

As regards the El Nino phenomenon, this was also taken up by the IDNDR Secretariat, partly in response to the related resolution of the United Nations General Assembly of December 1997. The IOC is a participant in this effort. Reference is also made to the account under Resolution XIX-13.

The Resolution EC-XXIX.2 is fully implemented.

Resolution EC-XXIX.3: Seventh Session of the Joint IOC-WMO Committee for the Integrated Global Ocean Services System (IGOSS)

Despite the retirement of the IGOSS coordinator in mid-1997, the programme, as adopted, is being gradually implemented. IGOSS is closely associated with GOOS. The IGOSS on-line bulletin was demonstrated at the GOOS Committee meeting (June 1997) and at the COP 3 of the UNFCCC (Kyoto, December 1997). The system receives an increasing attention. The decision by COP 3 to look into the climate-related observing systems situation and funding may help remedy some of the recent declines in data provisions and increase the coverage of data sparse areas in the Southern Hemisphere.

The Resolution is being gradually implemented. Further support from Member States to the IOC Trust Fund would be highly desirable.

Resolution EC-XXIX.4: IOC Sub-Commission for the Caribbean and Adjacent Regions

One professional/consultant and one secretary are still covered by the IOC funds from Paris. Donor funds are available from Sweden and USA, but this is not sufficient for a strong programme implementation. Several activities are planned for the 1998 IYO programme, including in association with the UNESCO Education Sector. An assessment of the state of health of the marine environment of the Caribbean has been carried out on the basis of the results from CEPPOL, through an IOC consultant. The Resolution EC-XXIX.4 is now substituted by Resolution XIX-9.

Resolution EC-XXIX.5: Third Session of the IOC Sub-Commission for the Western Pacific (WESTPAC)

The resource situation for the IOC-WESTPAC Secretariat in Bangkok, Thailand has improved during 1997 with the arrival of a P-4 UNESCO staff member and an Associate Expert from the Netherlands. The extrabudgetary P-3 post is also maintained from IOC. Some donor funds from Sweden and Japan have been obtained for a strengthened programme implementation. Several activities are underway as part of the 1998 IYO programme. Some of these also involve other sectors/programmes of UNESCO. Cooperation and coordination with the UNESCO

Offices in Bangkok and Jakarta is going very well. The Resolution is being implemented.

Resolution EC-XXIX.6: Southern Ocean Forum and Regional Committee for the Southern Ocean

The information network is being further developed. The proceedings of the Forum are being published. A detailed programme of activities has been developed and endorsed by the Assembly. Cooperation is maintained with other bodies active in the Southern Ocean. This Resolution is implemented and substituted by Resolution XIX-12.

Resolution EC-XXIX.7: Black Sea Regional Committee (IOC-BSRC)

The programme is being gradually implemented. Association with other bodies and programmes is satisfactory and the IOC Regional Committee is becoming acknowledged as a partner. Funding is still unsatisfactory.

3. OVERVIEW OF IOC PROGRAMME STRUCTURE

The IOC programme implementation continues on the basis of the decisions of the Governing bodies, and following the programmatic structure developed over the last decade. However, considerable adjustments are taking place so as to respond to UNCED and UNCLOS. Emphasis is also given to the regional subsidiary bodies. The capacity building efforts are part of all IOC actions, but in particular, the regional programmes.

During 1997, an assessment of the current organizational structure of the IOC Secretarial was completed. Based on the needs detected, a proposal to re-define posts and to reinforce the office of the Executive Secretary is under consideration, for implementation during 1998.

B. PROGRAMME ACTIVITIES

1. OCEAN SCIENCE

1.1 OCEANS AND CLIMATE

Much has been learned about the behaviour of the global climate since the establishment of the WCRP in 1979 as the research component of the World Climate Programme. Ever since then, the Joint Scientific Committee (JSC) for the WCRP has overseen the orderly development and prosecution of major international activities, and the Program=s sponsors, the IOC, ICSU and WMO, have observed the steady unfolding of achievements with great satisfaction. This year, it was considered timely to review and assess the record of progress and identify priorities for future research by way of the first international Conference on the WCRP: Achievements, Benefits and Challenges, which was held in Geneva, 26-29 August 1997. Well over 300 members of the climate research and policy communities present at the Conference agreed that comprehensive observations of the climate system are critical and noted with concern the decline in conventional observation networks. This is a serious threat to continuing progress in climate prediction. The Conference statement which was transmitted to the Conferences of the Parties to the United Nations Framework Convention on Climate Change stressed that without action to reverse this decline and develop the Global Climate Observation System, (GCOS) and its oceanographic and terrestrial counterparts (GOOS and GTOS), the ability to characterize climate change over the next 25 years will be even less than in the past quarter century. Without the necessary support for these systems the future assessment reports of the Intergovernmental Panel on Climate Change (IPCC) which draw heavily on WCRP research and on the observational data sets will be significantly compromised.

Quite fittingly, coinciding with the WCRP Conference, nature served up one of its most spectacular climatic events: an El Nino that, by August 1997, showed signs of being the most intense of the century. The capability to predict this event with sufficient lead time to take steps to mitigate or profit from its effects is a direct result of the WCRP=s Tropical Ocean - Global Atmosphere (TOGA) project. Predictions so obtained are in increasing operational use and are providing benefits in drought preparedness, water resources management, agriculture and public health in both developing and developed countries. The El Nino oceanic observation network established under TOGA, an array of 70 moored buoys in the tropical Pacific monitoring winds, currents, and temperatures, will be a major contribution to GOOS.

Planning for the CLIVAR (Climate Variability and Predictability) program continued. This 15-year effort will build on the results of TOGA and WOCE. The implementation plan was completed in December 1997 and an international meeting to introduce the plan and seek commitments from nations was scheduled. The IOC will host the meeting in UNESCO, Dec 1-3, 1998.

1.1.1 WOCE

The intensive observational phase of WOCE ended in 1997. Progress with WOCE will be reviewed in the WOCE Conference, May 24-29, 1998, in Halifax, Nova Scotia. The transition to the Analysis, Interpretation, Modelling and Synthesis (AIMS) phase of WOCE was the priority item on the agenda of the WOCE Scientific Steering Group (SSG) which met in Boulder, Colorado, 22-26 September 1997. It is from the AIMS phase that the payoff of WOCE will come, yet, national funding thus far identified in most countries is less than satisfactory and the ultimate successful achievement of the WOCE goals is in jeopardy. WOCE scientists hoped to help improve this situation by more actively promoting AIMS. This effort will be assisted by the publishing and distribution of the AIMS Phase Strategy document, the final draft of which was completed in December 1997.

WOCE continued with its plan to hold individual ocean basin workshops. From the 1996 Pacific workshop, final manuscripts for a special publication of the Journal of Geophysical Research (JGR) neared completion. Abstracts of papers given at the South Atlantic workshop held in Brest, France 16-20 June 1997 were published and distributed. From the Southern Ocean workshop held in Hobart, Australia, 7-11 July 1997, 24 potential papers were identified to be included in a special JGR publication. Plans were being developed for workshops on the Indian Ocean in New Orleans in September 1998, and the North Atlantic in Kiel in August 1999.

Despite the attempts of the past two years aimed at building international modelling capability, to develop the next generation of ocean models, very little progress can be claimed. Towards this end, WOCE plans to hold several modelling workshops, the first to be held in NCAR, 10-13 August 1998. These workshops will bring together observationalists and modelers/assimilators to stimulate progress in model development. Later, in 1999, a second workshop will focus on representativeness of the data.

1.1.2 Ocean CO_2 and Climate

The long partnership with SCOR/JGOFS in cooperation with WOCE has succeeded in assembling a global CO_2 data set of unsurpassed quality. This effort overseen by the IOC-JGOFS Ocean CO_2 Panel is remarkable both for the high accuracy and consistency of measurements achieved. The development and widespread use of certified reference materials, the interlaboratory intercalibration tests and other measures taken served well to assure that an international internally consistent data set would be obtained with known error bars, irrespective of who took the data, and what equipment or ship platform was used. This was essential because, despite the best efforts of section-by-section quality control efforts, without standard reference materials the potential for systematic biases of varying signs and amplitudes to exist between individual cruise data sets was always present. This is, of course, true of all biogeochemical parameters including those obtained by WOCE, such as dissolved nutrients and oxygen, for which, unlike CO_2 , no certified reference materials exist.

The unprecedented accuracy of CO_2 measurement achieved has implications for these other WOCE data sets. The relevance to WOCE is, that despite the significant stoichiometric variability in the concentrations of individual parameters in the deep ocean (which complicate simple direct comparisons of data collected on different cruises), the relations between inorganic carbon and the concentrations of nutrients and oxygen are relatively robust and invariant over extensive temporal and spatial scales. Thus the globally consistent CO_2 data set, because its accuracy is anchored in certified reference materials, has the potential for use in assessing the internal consistency of WOCE nutrient and oxygen data as well.

Members of the CO_2 Panel have continued to play important roles in other IOC Panels and workshops, particularly where biogeochemical expertise is needed. For example, the previous chair Liliane Merlivat, was also a member of the OOSDP, a participant in the GOOS- GCOS- WCRP- JGOFS sponsored Time Series of Ocean Data Workshop, and has been appointed as a new member of the GOOS Steering Committee (GSC see J-GOOS). The present chair, Andrew Watson played a key role in the most recent IPCC assessment.

Up until now, effort has been focussed on issues of measurement protocol, validation of techniques, and the co-ordination of the measurement effort by different nations to assemble a consistent global ocean pCO_2 data set. However, an awareness is growing that significant change in air-sea CO_2 fluxes is only one of several processes by which the marine biogeochemical systems may affect global change and atmospheric chemistry, and that these processes are linked through complex feedback mechanisms that coupled models have not yet got right. Clearly,

it will be necessary to better understand these systems in order to predict future global change.

The IOC-JGOFS Panel debated the question of whether its scope should be broadened to include other climatically active gases that are affected by ocean processes (e.g., nitrous oxide, methane, methyl halides, hydrohalocarbons, dimethyl sulphide). There is justification for contemplating such change in that this is an area that is poorly understood, the roles of these gases in coupled climate models are recognized weak points, and there is no international group that is specifically concerned with this science. Because there are still significant CO_2 issues to be resolved, and the successes thus far were due in large part to the Panel=s intentional narrow scope, the members concluded that addressing the Pandora=s box of other gases should be considered by a measured approach, ever mindful to not over-dilute its effectiveness.

At present, there are two dominant issues that require consideration by the Ocean CO_2 Panel: 1) how realistic are the simulated future ocean circulation changes for a prescribed radiative forcing scenario; and 2) how will the marine biosphere and the carbon export production be affected by global warming and ocean circulation changes. This entails some change in the composition of the Panel to include more biogeochemistry and modelling expertise, and perhaps greater representation from the atmospheric side. The need for more biogeochemical expertise was also based on the belief that processes in the coastal areas that influence the carbon cycle are not sufficiently well understood. Their potential impact on the carbon cycle can be much greater than their proportional 16% area of the oceans since distribution and biological productivity are twice per unit area of that of the open ocean. The Panel has opened a dialogue with LOICZ to consider appropriate interaction on this subject.

1.1.3 CLIVAR

At the GCOS-JSTC meeting, F.Schott (funded by IOC), gave compelling evidence for decadal change in the North Atlantic Oscillation. The NAO index increases as pressure increases in the Azores High and decreases in the Iceland Low, leading to (i) more Westerlies, making it wetter in NW Europe and drier in the Mediterranean and N.Africa; and (ii) increased N Atlantic winds and storms making waves higher. Clearly we are dealing with a coupled ocean-atmosphere system. Dr. Schott showed that the NAO Index has been increasing in parallel with climate warming signals over the past few decades, and concluded by demonstrating that the NAO Index has dropped sharply in the past 2 years, leading to cold winters. This led him to pose the question - is the supposed global warming a function of this decadal change in NAO? As another example he noted that cooling in the Labrador Sea shows up 5 years later in the Sargasso Sea. How do these things happen? Here we have major research questions which can only be answered using repeated observations. So there is a close link between research and GOOS. Observing systems are also needed to answer questions about whether and, if so, how the thermohaline circulation switches on and off.

1.1.4 El Niño of 1997-1998

The 1997-1998 El Niño event, by some measures, was the biggest on record in over a century. The Nineteenth IOC Assembly in July 1997 sensing the concern of member states in coping with El Niño phenomena in general passed Resolution XIX-13, calling for the acceleration of IOC activities regarding socio-economic study of the ENSO phenomenon and called on member states to improve mechanisms for dissemination of ENSO forecasts with a view to reducing the extent of human and economic damage. The Executive Secretary of IOC, in November 1997, forwarded a letter to a number of agencies and institutions proposing the convening of a workshop or conference to focus on the oceans as a factor in modelling and prediction, the impact of the oceans on user communities and the response of those involved in ocean related management. Shortly after, on December 18, 1997, the UN General Assembly passed Resolution 52/200, which requested action for the development of a strategy for the prevention, mitigation and rehabilitation of the damages caused by the El Niño phenomenon. With knowledge of the forthcoming UNGA resolution, an Interagency Task Force on El Niño was established on November 18, within the framework of the International Decade of Natural Disaster Reduction to carry out this charge. The IOC joined this collaboration under the leadership of WMO, which also includes UNESCO and other UN agencies and cooperating organizations. An objective of the IOC in working with the Task Force was to pursue a retrospective of the current El Niño, including an appropriate international conference.

Several of the tasks of the IDNDR Task Force on El Niño relate directly to the work of the IOC. These include:

1. Translating scientific knowledge into societal context with regard to community targeted hazard assessment and monitoring, vulnerability analysis and risk reduction.
2. Evaluate possibilities for longer-term research on the El Niño phenomenon and its effects and impacts, including the collection of historical data and the development of a compendium of past knowledge.
3. Exchange information on, promote the organization of, and solicit and facilitate the participation in workshops on El Niño at the local, national and regional levels as well as the global level, if appropriate.

Indonesia

The impact of the current El Niño on Indonesia during 1997 was greater than anything in this century including the appearance of traces of famine in the eastern provinces. Several hundred people have died others have moved out of traditional areas looking for food. It is still not clear if the event was more intense than the AGreat Dry@ of 1877-1878 (double-droughts) but it had a greater impact than the event of 1982-1983. The Agreat dry@ promoted famine around the world and prompted the Dutch to put-in the extensive meteorological data network existing to this day in expanded form in Indonesia. Other droughts have caused great hardship in Indonesia (i.e. 1914) but the 1877-1878 was possibly the worst.

The bulk of the rainfall and temperature record indicated that of 31 ENSO events; the majority caused one drought-year at a time in Indonesia, preceded and followed by a wet year (normal to an extent). Eleven of these events seem to have presented no particular problem to Indonesia at all. There were a few severe dry events around the turn of the century then the ENSO Awent quiet@ for around 37 years or so (after 1914) as far as an association with the AWestern Pacific Dry Event@ is concerned. It has recently become active again so that in the region of Jakarta 2 years separate the current dry event from the previous, 2 before that, then 3 then 4 then 8 then 5 then over 6 etc. In other words the Western Pacific Dry Events, as registered in Jakarta are becoming significantly more frequent and perhaps more intense. Another point to note is that the ambient temperature was cooler for 1877 in Indonesia than is now the case.

During this century, the years 1982-1983 presented a situation in which a double-drought occurred similar to that of 1877-1878. These are the only 2 such severe Adouble@ events on the instrumental record. Data prior to and during 1877-1878 are quite scarce making it somewhat difficult to evaluate the relative impact of 1997-1998. In short, the impact to date in 1997 is significant but what about 1998? What should be expected in Indonesia? The general case or a particular expression of a double-drought? Since the expression of ENSO follows a chaotic function it is difficult to say but a significant continuation of the warm event well into 1998 is projected.

IOC advised the Ministry of Environment to: 1) hold a national workshop to evaluate the situation and the prospects for a follow-on drought in 1998 and to estimate the impact of the 1997-1998 El Niño relative to the 1982-1983 & 1877-1878 events by extracting historical and social records; 2) present the results to a regional workshop at Okinawa on the occasion of the WESTPAC Scientific Seminar in early February 1998. Funding was advanced to Indonesia in order to facilitate the implementation of a national workshop.

1.2 OCEAN SCIENCE IN RELATION TO LIVING RESOURCES

The IOC Programme on Ocean Science in Relation to Living Resources (OSLR) is addressing scientific issues related to marine living resources. With the proliferation of international scientific programmes, global intergovernmental research and monitoring activities, and legal agreements concerning the marine environment, the nature of OSLR has gradually shifted into a framework programme for IOC Member States to share knowledge and develop co-operative actions. These are conducted in conjunction with the international and intergovernmental initiatives and programmes. The OSLR Programme sponsors and co-ordinates several activities and maintains strong links to the Global Ocean Observing System (GOOS), especially the Global Coral Reef Monitoring Network (GCRMN) and the developing Living Marine Resources module of GOOS. Recent additions to the staff include a Senior Assistant Secretary and two Associate Experts.

1.2.1 The Harmful Algal Bloom Programme

The Fourth Session of the Intergovernmental Panel on Harmful Algal Blooms (IPHAB-IV) was held in Vigo, Spain on 30 June - 2 July 1997 and was hosted by Instituto Español de Oceanografía. More than 40 participants from 27 countries attended the session. The attendance has been regularly increasing since the First Session in 1993 which demonstrates the global concern for HABs. A scientifically integrated and geographically coordinated effort is required to address the causes of HABs and develop means to mitigate the effects on marine organisms, human health and economy.

For the intersessional period the Panel decided to give priority to the development of an international science agenda on ecology and oceanography in relation to HABs to provide a platform for member states to develop national and international HAB strategies, research and monitoring programmes. Strengthening of a coordinated effort in the regions was recommended. The importance of continued long-term studies of phytoplankton as a routine part of international monitoring programmes was emphasised and it was recommended that the work on improved management and mitigation of the effects of harmful algae be continued at an International Workshop.

In May 1997 the HAB Programme Office at the IOC Secretariat was staffed with one associate expert seconded by Denmark.

Meetings and workshops

The ICES-IOC Working Group on Harmful Algal Bloom Dynamics held its fifth annual meeting in France in April 1997. At the meeting it was decided that IOC/HAB maintain a database on harmful algal bloom occurrences throughout the world starting with data collected in the ICES area during the past 10 years. The Working Group discussed the role of micro-organic nutrient dynamics, the impact of grazing and physical-biological interactions. The Working Group will meet again in Portugal in 1998.

The ICES-IOC-IMO Study Group on Ballast Water and Sediments held its first meeting in France in April 1997. The study group recommended means to address the challenges of these problems and exchanged information on research programmes, and coordination and calibration of sampling techniques. The study group will meet again in the Netherlands in 1998.

The Third IOC/FANSA Workshop on HABs was held in Chile in July 1997 to assess national and regional HAB problems, and common regulations for the region. The Workshop had 56 participants from six Latin American countries

Training and capacity building

The training and capacity building component of the HAB Programme is still very strong. At the Eighth International Conference on Harmful Algae, Spain, 25 - 29 June 1997 it was encouraging to see that several former participants to HAB training courses presented work using the techniques and knowledge obtained during these courses.

Seven training courses were organized during 1997 with almost 100 participants from the following countries:

Argentina, Australia, Brazil, Chile, P.R. China, Colombia, Cuba, Denmark, Egypt, Estonia, Equador, Fiji, Finland, Guatemala, Hong Kong, Iceland, India, Indonesia, Trinidad, Kenya, Republic of Korea, Kuwait, Latvia, Lithuania, Madagasca, Malaysia, Mexico, Mozambique, Netherlands, New Zealand, Norway, Papua New Guinea, Peru, Philippines, Russia, Sweden, Thailand, United Kingdom, Uruguay, Vietnam.

The training courses held during 1997 were:

- IOC/WESTPAC Training Course on Species Identification of Harmful Microalgae, Asian Natural Environmental Science Centre, University of Tokyo, Japan, 28 February - 8 March.
- IOC-FURG-DANIDA Training Course on Taxonomy and Biology of Harmful Marine Microalgae, University of Rio Grande, Rio Grande, Brazil, 3 - 14 March.
- IOC-IEO Training Course on Analytical methodologies for the detection of Marine Toxins, IOC-IEO Science and Communication Centre on Harmful Algae, Instituto Español de Oceanografía, Vigo, Spain, 29 June - 16 July
- IOC-Danida Training Course on the Taxonomy and Biology of Harmful Marine Microplankton, IOC Science and Communication Centre on Harmful Algae Copenhagen, University of Copenhagen, Denmark, 18 - 31 July.
- IOC-NorFa Training Course on Taxonomy and Biology of Harmful Microalgae in the Baltic, Tvärminne Biological Station, Finland, 16 - 22 August.
- IOC/WESTPAC Training Course on Species Identification of Harmful Microalgae, Asian Natural Environmental Science Centre, University of Tokyo, Japan, 22 - 30 August.
- IOC-APEC Training Course on Identification and Monitoring of Harmful Marine Microplankton, IOC Science and Communication Centre on Harmful Algae Copenhagen, University of Copenhagen, Denmark, 12 - 19 October.

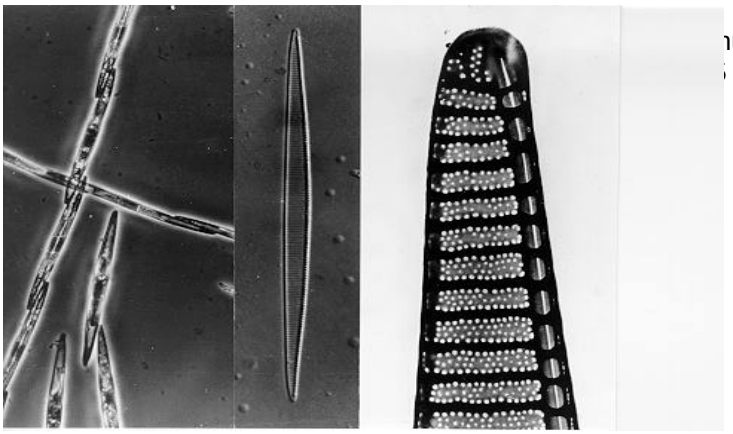


FIGURE 1

Pseudo-nitzschia is a genus of potentially harmful algae which is difficult to identify without electron microscope. Toxic members of this genus causes Amnesic Shellfish Poisoning syndrom (ASP). At the IOC training courses in Copenhagen the techniques for identification are part of the programme, and through the analysis of samples from the home countries of the trainees we now know that potentially toxic species of this genus are much more widespread than previously known. (Photo by. N. Lundholm)

Other activities

The HAB Programme co-sponsored the Eighth International Conference on Harmful Algae held in Vigo, Spain 25 - 29 June 1997 and the Second International Conference on Molluscan Shellfish Safety (ICMSS) in the Philippines 17 - 21 November 1997, providing support for experts from developing countries to participate. At the ICMSS, staff from the Science and Communication Centre on Harmful Algae co-chaired a Workshop on Molluscan Shellfish Safety: Research and development priority areas.

The Science and Communication Centres on Harmful Algae in Copenhagen and Vigo organized and chaired a Workshop on Potentially Harmful Microalgae in the South Pacific within the Marine Benthic Habitats Conference in Noumea, New Caledonia, 10 - 14 November 1997. At the Workshop it was decided to strengthen the network between researchers of the region to enhance the co-ordinated effort in mitigating the effects of harmful algae.

The publication of the IOC newsletter Harmful Algae News continued. The newsletter is available on the internet at http://www.unesco.org/ioc/news/newslet.htm. Due to limited submissions only one issue was published during 1997. The Science and Communication Centres in Vigo and Copenhagen are now assisting in the production of Harmful Algae News.

The AInternational Directory of Experts in Toxic and Harmful Algae and Their Effects on Fisheries and Public Health@, first published in 1995, was updated and is now availably on the IOC home page http://www.unesco.org/ioc/isisdb/htlm/habdsearch.htm on the Internet. A printed version is being published.

The IOC Science and Communication Centres on Harmful Algae

The establishment of HAB Programme activity centres was adopted at the Seventeenth Session of the IOC Assembly (Paris, 1993), and Denmark and Spain offered to host and establish Science and Communication Centres on Harmful Algae. The main purpose of the Centres is to provide the basis and leadership for systematic assistance in training and capacity building to developing countries with respect to harmful algae.

The IOC Science and Communication Centre on Harmful Algae in Copenhagen, Denmark, opened in May 1995. The Centre has three permanent staff members and is hosted by, and located at, the Botanical Institute, University of Copenhagen. Activities are centered around training in taxonomy of harmful species and associated services, including a species identification confirmation service. Co-operation is extensive with the host institute of the University. The Centre is sponsored by DANIDA (through the IOC Trust Fund), the University of Copenhagen, the Danish Ministry of the Environment, the Danish Ministry of Fisheries, and IOC initially for a five-year period.

The IOC-IEO Science and Communication Centre on Harmful Algae in Vigo, Spain, opened October 1996, and is hosted by, and located at, the Instituto Espanol de Oceanografia (IEO). There are two permanent staff members and the opportunity to cooperate with other IEO staff. Activities will be centered around training in toxin chemistry and ecological aspects, and in particular in cooperation with research institutions in Latin America. The Centre is sponsored by the Spanish Ministry of Foreign Affairs (through the IOC Trust Fund), Instituto de Cooperacion Iberoamericana, IEO, and IOC initially for a five-year period.

The activities of the two Centres are coordinated and coupled, and are intended to be complementary.

The Copenhagen Centre

In 1997 the activities at the Copenhagen Centre were focussed on training. The Centre organized/co-organized four IOC training courses (Brazil, Copenhagen, Finland and Copenhagen, see above). More than 60 scientists received training in 1997 in identification of harmful algae, culturing techniques, quantitative and qualitative techniques, planning of monitoring programmes and HAB management.

In particular the Centre had close cooperation with Vietnam during 1997. Staff from the National Fisheries Inspection and Quality Assurance Centre (NAFIQACEN) and the Institute for Aquaculture Research of Vietnam have been specifically trained for monitoring of potentially harmful algae in relation to harvesting of baby-clams in the Mekong delta. In cooperation with DANIDA, laboratory and field equipment have been provided. The cooperation with Vietnam is expected to expand in 1998 through a cooperative research project. Staff from the Centre visited Vietnam during September 1997 to prepare for the project which aims at publishing a bilingual (Vietnamese-English) identification guide for potentially harmful microalgae in Vietnamese waters. In cooperation with Aarhus University, the Copenhagen Centre is supervising one Msc and one PhD student from Vietnam.

FIGURE 2
The bi-valve industry is often severely affected by the occurrence of harmful algae. In both temperate and tropical regions bi-valves represent a important source of revenue, and the need to protect this valuable resource from algal toxins is growing. Here, trainees from Vietnam are visiting a harvesting site in the Danish Limfjord. (Photo by H. Enevoldsen).

A major task of the Copenhagen Centre is to compile a bibliographic database on harmful algal literature. This comprehensive task is being carried out within the framework of the Aquatic Fisheries and Fisheries Abstracts (ASFA). The work has proceeded well during 1997, and it is expected that the database will be ready for use during first half of 1998.

The Copenhagen Centre offers an extensive literature service to libraries and researchers in developing countries. Key reference books, as well as IOC and UNESCO publications are donated free of charge to research libraries.

Results of the cooperative research at the Copenhagen Centre were presented at the Eighth International Conference on Harmful Algae, Spain, June 1997.

The Vigo Centre

An annual course on toxic phytoplankton is held at the Vigo Centre. The title of the 1997 training course was ›Toxic Phytoplankton: Analytical Methodologies for the detection of Marine Toxins=. This advanced course dealt with toxin detection techniques implemented in research and monitoring programmes. The course had 12 participants from Argentina, Brazil, Chile, Colombia, Cuba, Guatemala, Madagascar, Mexico and Peru. To complement their training, participants were also invited to attend the VIII International Conference on Harmful Algae, June 1997 that preceded the course.

The Vigo Centre and collaborative institutions also assisted at other courses such as the Doctoral Course on Toxic Microalgae in Mediterranean Countries, Museum National D=Histoire Naturelle in Paris, France, 26-28 March 1997, and the IOC courses in Brazil and Copenhagen (see above).

Scientists and managers from other countries have been invited by the Vigo Centre to work at the IEO as a way to strengthen the individual training and to complement the training courses. The Vigo Centre has also started a series of local seminars called Red Fridays.

In 1997 the Vigo Centre responded to requests on: i) extraction methodologies for the determination of ciguatoxins by the mouse bioassay, ii) epidemiology of ciguatera in the South Pacific, and iii) a regional action programme in marine ecotoxicology in the Indian Ocean.

The Vigo Centre took active part in the organization of the VIII International Conference on Harmful Algae in Vigo, June 1997, and assisted in the subsequent Fourth Session of the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB IV). Staff from the Vigo Centre participated as observers at the annual meeting of the IOC-FANSA Regional Workshop on Harmful Algal Blooms in South America.

IOC and IEO publications on harmful algae were distributed free of charge to scientists, managers and other professionals from research and educational institutions in Latin-American countries and Spain. The Vigo Centre edited the abstracts of all contributions to the VIII International Conference on Harmful Algae and made them available at the IOC web-page as a searchable data base.

Harmful Algal Bloom Programme in WESTPAC:

IOC/WESTPAC-HAB has received significant support from Japan to conduct training courses and capacity building in the WESTPAC region and to provide a species identification confirmation service. The support is for a 10 year period starting 1995.

Two training courses on harmful algae was organized in 1997 by Prof. Fukuyo from the University of Tokyo. The courses took place on 28 February - 8 March 1997 and 22-30 August 1997 and was attended by participants from 12 different countries in the WESTPAC region. For more information see also paragraph 5.2.2.2.

The co-operation between the University of Tokyo and the HAB centre in Copenhagen and the WESTPAC secretariat was strengthened during separate visits of representatives of both institutions to Bangkok. Discussions were held on possible follow-up activities in the region.

1.2.2 Marine Biodiversity

The concerns regarding maintenance of biological diversity (or biodiversity) has gained full international recognition thanks to the Convention on Biological Diversity (CBD) process, with nations agreeing upon the need to protect biodiversity, that biodiversity should be used in a sustainable manner, and that the benefits arising from biodiversity should be shared. The issue of marine biodiversity remains scientifically challenging, even in those countries where the present knowledge already represents a substantial basis for action. However, much can be achieved in preserving the biological diversity of the world=s ocean, by developing concrete initiatives on the basis of what is presently known. Scientists realize that trends in the discovery of new marine species indicate that many species still remain to be described (figure below).

The international legal framework for actions on marine and coastal biodiversity is given by the CBD Conference of the Parties= decision on the protection and sustainable use of marine and coastal biodiversity, AThe Jakarta Mandate@; for the IOC, Resolution XVIII-9 adopted by the IOC Assembly in June 1995 provided an agreed

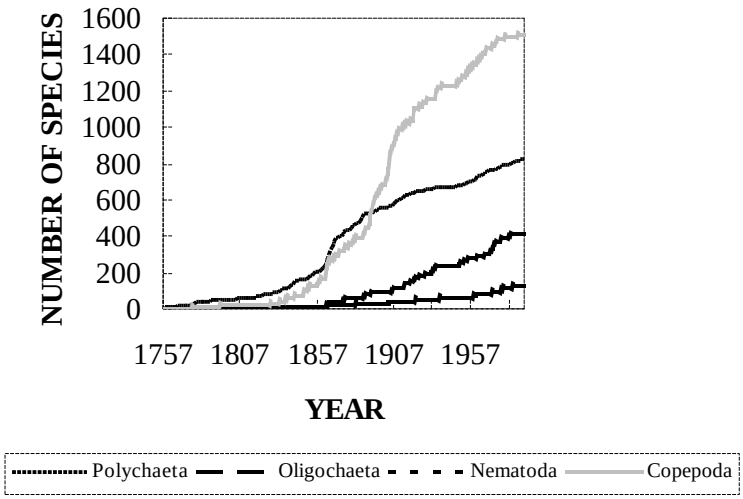
co-operation framework for IOC Member States to undertake actions in the field of marine biodiversity. The IOC Marine Biodiversity Strategy became increasingly operational in 1997. Information can also be obtained by exploring the IOC marine biodiversity web site at: http://www.unesco.org/ioc/oslr/biodiv.htm.

IOC Marine Biodiversity Products

1) UNESCO-IOC Register of Marine Organisms (URMO)

This project was initiated in 1995 and continues successfully. A substantial bibliography of the marine biodata is now available for this computerized tool for taxonomic inventories. Co-operation between URMO and the IUBS-CODATA-IUMS-UNEP Species 2000 initiative (http://www.sp2000.org/) was strengthened.

Examples of trends in the discovery of marine species in Britain and Ireland



(courtesy of M.J. Costello - mcostello@ecoserve.ie)

http://www.unesco.org/ioc/oslr/taxon.htm

2) Directory of Marine Species in Europe

IOC is one of the partners to a project aimed to produce a Directory of Marine Species in Europe. The project proposal was developed by the participating institutions (22 in total, mainly European research institutions) in the period 1996-97, and the European Union (EU) recently agreed to fund it. The Directory will be linked with a bibliography of identification guides, register of taxonomic experts, and location of collections of reference specimens, and an Information Pack of European Marine Biodiversity (based on the project=s results). Both the draft and final versions will be in the public domain and accessible through the World Wide Web. It is anticipated that it will become a standard reference (and technological tool) for marine biodiversity training, research and management in Europe. The project will officially start in early 1998 and will be completed within 24 months. (For further information, contact Dr. Mark Costello, Co-ordinator (mcostello@ecoserve.ie) or the IOC Secretariat.)

Training and capacity-building

Training courses in taxonomy of harmful microalgae were organized by the Harmful Algal Blooms Programme (HAB) (see related section of this report), and a course on seagrass mapping, involving satellite imagery processing was held in Zanzibar, Tanzania in November 1997 for East Africa coastal mainland states (see section

under Critical Habitats).

Co-operation with the Convention on Biological Diversity

IOC participated in its expert capacity in the First Meeting of the CBD Group of Experts on Marine and Coastal Biodiversity (Jakarta, March 1996) and contributed information on how best to use marine science and observations to implement integrated marine and coastal area management (IMCAM) - the Jakarta Mandate's thematic area that encompasses the other four areas of the Mandate: sustainable fisheries, mariculture, marine protected areas and alien species.

IOC attended the Third Session of the Subsidiary Body on Scientific Technical and Technological Advice to the Convention (SBSTTA) (Montreal, Canada, September 1997) and contributed a paper on marine biodiversity patterns, threats and conservation needs prepared by Dr. J.S. Gray on behalf of the Group of Experts on Scientific Aspects of Marine protection (GESAMP), of which IOC is an active co-sponsor.

A memorandum of co-operation was signed between the Executive Secretary IOC and the Executive Secretary CBD, which includes provisions for institutional co-operation; for joint use of relevant CBD and IOC group of experts; for exchange of information on marine and coastal biodiversity and the CBD Clearing House Mechanism; and for co-ordination of joint activities, such as training courses and workshops, the identification of assessment and monitoring indicators, and compilation of a publication on a Global Biodiversity Outlook.

IOC also attended the Eight Session of the Global Biodiversity Forum (Montreal, September 1997) and provided information on policy issues related to biodiversity and contributed to the workshop on partnerships with the private sector aimed at protecting marine and coastal biodiversity. Co-operation with other NGOs involved in marine biodiversity continued, including with BIONET, specifically on the provision of relevant information to the biodiversity Internet network.

Research activities

During 1997, procedures were defined for co-operation with the ICSU-IUBS DIVERSITAS programme. DIVERSITAS has now its Secretariat within UNESCO. IOC has entered in co-operative agreements with the DIVERSITAS Secretariat relative to initiating co-ordinated research on deep sea biodiversity.

IOC contributed to the updating of a Black Sea biodiversity inventory. It is planned that pilot activities on biodiversity hot spots, using rapid assessment methodologies, start next year, in support of the Convention on Biological Diversity. Co-operation took place with the IUCN World Commission on Protected Areas, on the organization of a scientific event in 1998 to discuss scientific requirements for protected areas in the high seas.

Co-operation was initiated with the European Working Group on Biodiversity Research on the design of a research agenda for European Union countries, to which IOC contributed through its marine biodiversity strategy and activities.

Regional strategies for marine biodiversity

The IOC Secretariat developed regional strategies aimed at the protection and sustainable use of marine biodiversity, as well as related training that might be needed; this was done in consultation with IOC Regional Subsidiary Bodies and relevant IOC groups of experts. Regional strategies were designed for: IOCARIBE (in co-operation with the Cartagena Convention and the Organization of Non-Aligned Countries); IOCINCWIO and IOCEA (the strategy is based on networking of taxonomists and provision of taxonomic tools to scientific libraries and museums all over African coastal countries); WESTPAC, for which project proposals for biodiversity are being designed in consultation with local scientists, before their submission to funding agencies.

1.2.3 Critical Habitats

IOC continues to have strong commitment to seagrass beds and coral reefs (see also section on Global Coral Reef Monitoring Network under GOOS)

The IOC-UNEP Training Course on Seagrass Beds Mapping from Satellite Images was held at the Institute of Marine Sciences, Zanzibar, Tanzania, from 24 to 28 November 1997.
This activity was jointly developed by scientific and technical professional staff of the IOC Secretariat and the Water

Branch of UNEP. Since 1991, UNEP has been carrying out an Eastern African Coastal and Marine Environment Resources Database and Atlas Project (EAF/14) which aims at providing policy- and decision-makers with relevant information on the marine environment (in an atlas format), which are most needed in the establishment of integrated coastal management (ICM). Until the present time, however, no information existed on the distribution of seagrass beds in the Eastern African region, since the focus had been put on other critical coastal systems such as mangrove and coral reefs.

Realizing the extremely important ecological role of seagrass beds, this IOC-UNEP workshop:
(i) demonstrated to which extent satellite imagery could be used successfully for the identification of seagrass beds in shallow marine waters (making use of satellite images acquired by the EAF/14 project); (ii) set a methodology for the identification of seagrass beds using Landsat TM imagery; (iii) trained 8 scientists from Kenya, mainland Tanzania and Zanzibar. These scientists were introduced to the use of a GIS software developed by UNESCO and known as Win Bilko. A report will be available in 1998. It is planned that this activity should be replicated for the Island States of the IOCINCWIO region together with Mozambique in 1998.

An IOC-SOPAC Conference on Marine Benthic Habitats and their Living Resources: Monitoring, Management and Application to Pacific Island Countries, was held in Noumea, New Caledonia, from November 10-14 1997. It was co-sponsored by France, the Territoryof New Caledonia and its Provinces, ORSTOM, South Pacific Commission, the Netherlands Geosciences Foundation, the Swedish International Development Agency and the European Union. The main objectives of the Conference were to:
i) Inform the participants of contemporary methodologies and techniques for studying marine habitats, fisheries and biodiversity; ii) Interpret case histories relative to South Pacific interests, demonstrating how these techniques have been applied to marine habitats (bays, laggoons, coral reefs, shelf and slopes, seamounts and ridges); iii) Identify crucial habitats and resources; iv) Propose a training component on techniques such as ROV=s, GIS, GPS, acoustic surveys, etc.; v) Establish the parameters for habitat monitoring systems to assist in management and sustainability of resources, giving consideration to the implementation of GOOS; vi) Develop proposals for joint international studies in areas of critical habitats

The Conference was convened to provide a forum for the gathering of geologists and biologists to identify potential areas of co-operation in the study of marine benthic habitats and living resources. While the focus was on the South Pacific, the results have global implications.

This was the first major Conference sponsored by IOC in the region and the first time that an IOC principal (Chairman or Executive Secretary) has visited the South Pacific. It would serve as an indicator of IOC=s commitment to the region and directly support UNESCO=s Pacific Island Initiative launched at its General Conference in 1997. The quality of the papers was high. Participation was strong throughout the week. Scientists identified many areas of common interest and living resource economic implications dominated the discussions. A Conference report, paper abstracts and Conference recommendations will be published . IOC=s contributions were much appreciated.

IOC will co-sponsor the Third International Seagrass Biology Workshop, to be held at the Marine Science Institute, Quezon City, the Philippines in Spring 1998.

The IOC International Directory of Seagrass Institutions was made available on IOC homepage: (http://www.unesco.org/ioc/oslr/).

1.2.4 GLOBEC (Global Ocean Ecosystem Dynamics)

The GLOBEC programme encourages projects that relate to understanding the structure and functioning of the global ocean ecosystem and its major subsystems. The GLOBEC Science Plan has been published (IGBP Report 40) and the Science Implementation Plan will soon be released in draft form. There will be a GLOBEC Open Science meeting to discuss the plan, 17-20 March 1998 hosted by IOC.

The GLOBEC Core programme includes two projects with major field components - Southern Ocean GLOBEC and Small Pelagic Fishes and Climate Change. There are two regional programmes co-sponsored by GLOBEC: the Cod and Climate Change Programme with the International Council for the Exploration of the Sea, and Climate Change and Carrying Capacity Programmes with the North Pacific Marine Sciences Organization. In addition to these, there are three multinational and ten national programmes including several with substantial field components.

GLOBEC is an IGBP core project and is also sponsored by IOC and SCOR. The homepage is: http:www1.npm.ac.uk/globec.

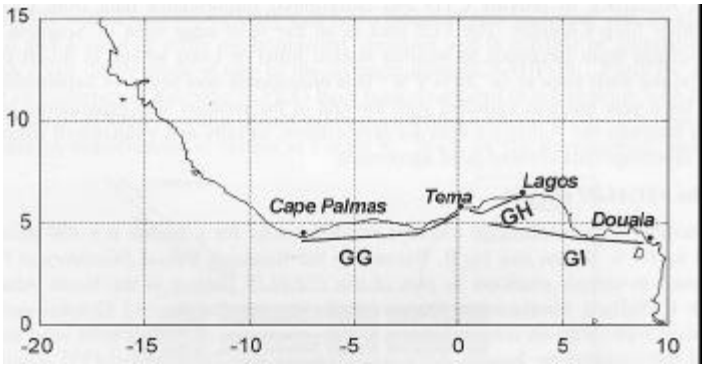
1.2.5 Large Marine Ecosystems (LME)

A consultative meeting on Large Marine Ecosystems was held at IOC in Paris in January 1997, organized jointly by IUCN, NOAA and IOC. This meeting was a follow up to earlier consultative meetings. The major intention was gathering information on the status of the growing numbers of project proposals for funding by the GEF for implementation of LME projects. In addition the meeting addressed the future role of the LME concept including recommendations on its development and proposed to use the International Year of the Ocean in 1998 and EXPO98 in Lisbon to highlight the LME concept.

At present an LME project is established in the Gulf of Guinea and several regions are either in the process of finalizing their project proposals, or have already obtained funds for pilot projects. The following regions are in the process of developing proposals for LME projects: Agulhas Current, Somali Current, Western Indian Ocean Gyre, Gulf of Thailand, Baltic Sea, Yellow Sea, South China Sea, Bay of Bengal, Humboldt Current, Benguela Current, and Caribbean Sea,

1.2.6 Continuous Plankton Recorder (CPR)

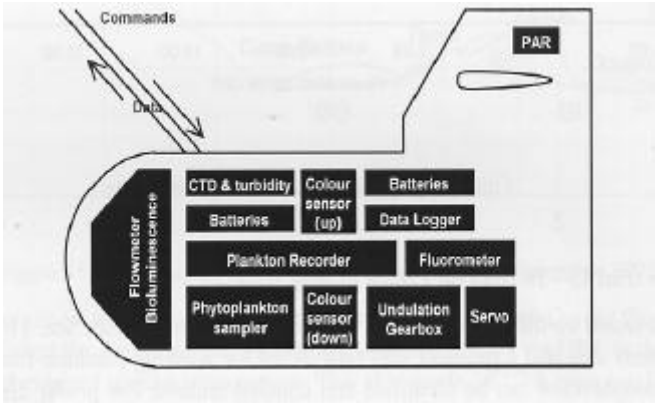
The Sir Alister Hardy Foundation of Ocean Science (SAHFOS), the implementing foundation behind the Continuous Plankton Recorder Survey supported by IOC, has increased further its monitoring activities. The CPR is an integral component of the Gulf of Guinea Large Marine Ecosystem Project (GOG). The new routes in West Africa are shown on figure below.



CPR Tows along the coast of West Africa in December 1995

Additional environmental sensors have been incorporated into the CPR for possible use on new routes. The recent developed undulating vehicle is not yet routinely used in the ships of opportunity as the vehicle is still undergoing evaluation. Some of the new instrumentation to be included on the towed vehicle is shown on the diagram below. A pilot tow was undertaken in the Pacific Ocean for the first time in August 1997.

During the 19th Session of IOC Assembly in June 1997 SAHFOS provided a exhibition partly on the life of Sir Alister Hardy, partly on the methodology of the CPR survey, including a display of the CPR vehicle with additional environmental sensors and the ability to undulate while sampling.



The undulating CPR showing sensors

The SAHFOS homepage and e-mail is:

Homepage: http://www.npm.ac.uk/sahfos/
E-mail: sahfos@wpo.nerc.ac.uk

1.3 OCEAN SCIENCE IN RELATION TO NON-LIVING RESOURCES (OSNLR)

Based on the instructions and recommendation of the Nineteenth Assembly of IOC in 1997 and the continuous follow-up to the Coastal Change Conference , Bordeaux, 1995, the activities of this programme in 1997 consisted mainly of: (i) an OSNLR Consultative Meeting to reinforce IOC=s and other organizations future contribution to the field of marine geoscience; (ii) implementation of the project on Manuals and Guidelines on Coastal Changes in Coastal and Small Island Developing Countries; and a training course on Marine Environmental Conservation in the IOC-WESTPAC Region.

1.3.1 OSNLR Consultative Meeting

As a follow-up to the decision made during the Nineteenth Assembly of the IOC through its resolution XIX-2, a Consultative Meeting was held from 1-2 December 1997 at the UNESCO/IOC Headquarters, Paris. Four Marine Geologists from the United Kingdom, France and IOC Secretariat participated in the meeting, including Dr. Peter Cook as Chairman.

The meeting agreed to meet the requirements of the IOC Assembly Resolution XIX-2 and also to consider non-living resources more extensively, as suggested by IOC Executive Secretary in his letter to Dr P. Cook.

The meeting reviewed the history and past activities of OSNLR from published records. One of the highlights of its development was acknowledged to be the concept of SETR, a programme including sedimentary environments, eustatic changes, tectonics and resources, and also natural and human impacts. From the early 1990s, OSNLR became increasingly focused on the coastal zone, this being the topic of the 1993 and 1995 BORDOMER conferences. In addition to these conferences and their proceedings, outputs from OSNLR included palaeogeographic maps/charts of SW Atlantic and WESTPAC and TEMA-linked workshops. It was recognized that many outputs from elsewhere in IOC had (unidentified) OSNLR inputs.

The meeting provided an excellent opportunity to review other programmes in IOC and elsewhere in UNESCO relating to the coastal zone, including GOOS, ICM, IOC-PACSICOM, CSI, IGCP and IGBP/LOICZ, highlighted by the key person of each programme. Most of these programmes need marine geoscientific inputs from OSNLR, especially the features and the geological processes of the seabed.

The following main actions were decided upon at the meeting:

(i) IOC to invite those members of the OSNLR Guiding Group of Experts that have contributed to the OALOS Brochure to a meeting in early 1998, to discuss the role of OSNLR in the Deep Ocean;

(ii) to compose a Sub-Guiding Group of Experts for the Coastal/Nearshore Element of OSNLR and organize a meeting during 1998;

(iii) consult on the feasibility of study of areas affected by deltaic sedimentation such as the Yellow Sea, Southeast/East Mediterranean, Tropical South America and Africa;

(iv) to maintain a dialogue with other IOC and UNESCO programmes relating to the coastal zone, identifying the most appropriate contribution from OSNLR.

1.3.2 Manuals and guidelines for methodology and for assessment, monitoring and management or shoreline changes

Following the decision adopted by the Coastal Change Conference and as decided during the IOC Assembly at its Eighteenth Session, the preparation of two manuals was initiated in 1996 to facilitate the assessment of coastal change and management of specific littoral areas facing the joint affect of human and natural activities causing rapid physical evolution in the area.

The first, "Guidelines for Assessment, Monitoring and Management of Physical Shoreline Changes for the West Indian Ocean Region", covers the Eastern Africa including Mauritius, Seychelles, Tanzania, Mozambique, Kenya, Comoros and Madagascar. This project has been implemented in co-operation with the CSI programme of

UNESCO with the support of SIDA (SAREC). On the basis of inputs from the participating countries and as a primary result of the IOC/OSNLR projet on Coastal Changes, the final draft of the manual was edited by Professors K. Kairu and N. Nyandwi and is now being reviewed by the relevant specialists and is expected to be published in early 1998. A Pilot Application Area will be chosen for a case study in order to establish an appropriate coastal change managing system to be reported and endorsed by IOCINCWIO at its coming session.

The second, entitled "Guide Méthodologique d'Aide à la Gestion Intégrée de la Zone Côtière", has been prepared by France in the framework of a joint action coastal management programme in co-operation with IOC, IGCP, MAB and IHP. This manual, printed in French, was published in early 1997 in the IOC series : Manuals and Guides No. 36 and reported to the IOC Assembly at its Nineteenth session.

1.3.3 IOC/KOICA/KORDI training course on marine environmental conservation for the marine scientists in the WESTPAC region

To adequately meet the increasing need for technological enhancement of developing countries on the conservation of marine and coastal environments, this training course was jointly organized by the IOC Secretariat and the Korean International Co-operation Agency (KOICA), with the Assistance of the Korea Ocean Research and Development Institute (KORDI), for the benefit of marine scientists from the IOC-WESTPAC region. The course was held from 18 September to 12 October 1997 at KORDI, Ansan City, Republic of Korea. Fourteen trainees from seven countries of the region participated.

The course was designed so that participants could become efficiently involved in planning research projects and survey cruises in their home institutes. The course included lectures on the fundamentals and methodology of ocean research, as well as on board training and introduction of case studies. The participants had the opportunity to handle sophisticated surveying equipment and instruments such as Seabeam-2000 Multibeam Ecosounder, Multichannel Seismic Profiler, Deeptow sidescan sonar, Piston corer and Box corer on board the Korean **R.V. ONNURI**. They also had the opportunity to participate in a field excursion to a coastal area of the Eastern Yellow Sea and to visit relevant universities and research institutes during the course.

1.4 OCEAN MAPPING

IOC activities in international ocean mapping began in 1969 after the endorsement by the UN General Assembly of the Long-Term and Expanded Programme of the Ocean. At present IOC contributions to the Ocean Mapping activities fall within three categories: GEBCO, GAPA and six regional ocean mapping projects.

GEBCO - GEBCO Digital Atlas (GDA)

The most significant event of this year was the Second Release of the GEBCO Digital Atlas (GDA) in May 1997. Although this version is free to all registered holders of the First Release, prospective recipients are asked to complete a two-page questionnaire before receiving their gratis copy. It is hoped that the information on the completed forms will provide the GEBCO community with a much clearer picture of the real needs of the scientific users of the GDA. To date, 756 copies of the GDA have been distributed to more than 500 organizations. Data authorization procedures were completed for the inclusion of several sets of new data for the Second Release. These included contour compilation for the Southern Indian Ocean area; a new contour chart of the Weddell Sea and selected bathymetric maps of the North-east Atlantic Ocean. Additional features were also added such as: five scale versions of the Antarctic coastline (replacing the outdated World Vector Shoreline in this area); updated inventory of the track lines of the digital sounding data held at the IHO Data Centre for Digital Bathymetry; IOC/IHO Gazetteer updated to include historical background material on the naming of many individual features and recently approved names; and lastly, modification and improvements to the software. The GDA GEBCO-97 package has been simplified, and now consists of three items only: GEBCO-97 CD-ROM (including the GDA Software Interface); ASupporting Volume to the GEBCO Digital Atlas@; and A1997 Supplement@ to the Supporting Volume. At the Fifteenth International Hydrographic Conference in 1997, the GDA was successfully demonstrated to His Serene Highness Prince Rainier III of Monaco who showed much interest in the achievement. Work is already in hand to compile data for inclusion in the Third Release of the GDA planned for 1999-2000. There are no plans at present to produce a sixth paper edition of the GEBCO. It is recognized that any future requirements for such maps might be met by print-on-demand techniques when suitably gridded contours, derived from the GDA, are available.

GDA Gridded Dataset

The quest continues to resolve the complex problems of producing an acceptable gridded solution from the current multi-scaled contours of the GDA. Meanwhile the voices of the scientific community, raised through the

SCOR WG meetings, reiterate their demands for this product. WG 107 on AImproved Global Bathymetry@ was set up in response to the growing demand for an authoritative global description of the bathymetry of the world=s oceans as a gridded data set. These pleas from physical and chemical oceanographers are in addition to the increasingly fine resolution requirements of marine geologists and geophysicists. The final meeting of WG 107 took place in Baltimore, USA, October 1997. The concluding report of WG 107 is expected to have a significant impact on GEBCO policy and activities. Following examination of the AReview of Gridding Methods@ during the Sub-Committee on Digital Bathymetry (SCDB) meeting in Taunton, 18-19 June 1997, the quest to find an acceptable gridding solution for the GDA contours was given by the US Naval Oceanographic Office (USNOO) which offered to co-ordinate the next phase of the work. A network of other volunteering participants was set up.

Sub-Committee for Undersea Feature Names (SCUFN)

Ten participants attended the Twelfth Session of the Sub-Committee for Undersea Feature Names, Southampton, United Kingdom, 23-25 June 1997, which was extended by one full day to deal with the large volume of names submitted for consideration. It also undertook a thorough revision of the definitions for undersea feature generic terms, which was later submitted to the GEBCO Guiding Committee. Although the majority of these definitions were accepted by the Sixteenth Session of the GEBCO Guiding Committee, held in Southampton, United Kingdom, 23-25 June 1997, a small number required much further discussion. Arrangements will be made to resolve differing opinions voiced at the meeting.

Sub-Committee on Digital Bathymetry (SCDB)

A record of twenty six experts from nineteen organizations attended the Fourteenth Session of the Sub-Committee on Digital Bathymetry, Taunton, United Kingdom, 18-19 June 1997. Twenty five papers were tabled. One of the aims of this Sub-Committee is to develop GEBCO as an up-to-date and authoritative source of bathymetry for the world >s oceans. A review of world bathymetric mapping was undertaken. Concerns were raised about certain aspects of the IOC International Bathymetric Chart Projects. These related to the possible misuse of automatic contouring packages, release of maps to the GDA (as they are completed), map digitization methods, GEBCO requirements for 500 metre contour interval data and other minor points.

GEBCO Guidelines

Draft Part 4, GEBCO Guidelines - Digital Bathymetric Data (Multi-beam Echo-Sounders) now only requires a small additional input from the IHB. Publication is expected soon. Changes to Part 2, Bathymetric Data Management, were identified. IHB will provide a draft for discussion at GEBCO Officers Eleventh Session in Wellington, New Zealand, March 1998.

GAPA

The International Geological-Geophysical Atlases of the Atlantic and Pacific Oceans (GAPA) is another endeavour of IOC in Ocean Mapping. The Atlantic Ocean Atlas was published in 1991 and has now been widely distributed to contributors and to IOC Depository Centres. The companion atlas for the Pacific Ocean is now in the process of being published. Under contract from the Houston Advanced Research Centre (HARC), the Russian Mapping Production Association AKartografia@ started in October 1995 to print this atlas. It was expected to be ready for distribution mid-1996, but because of lack of funds, the Atlas will only be printed in November 1998. However, it was possible for IOC to support some activities within the framework of the above-mentioned project and a monography entitled AEquatorial Segment of the Mid-Atlantic Ridge@ with its attachment AThe maps and profiles@ was published in 1997 in the IOC Technical Series and is now available to users.

International Bathymetric Chart of the Arctic Ocean (IBCAO)

In accordance with the decision of the IOC Assembly at its Nineteenth Session, Paris, France, July 1997, the project of IBCAO was established within the framework of the IOC Ocean Mapping Programme. The first meeting of the IOC Editorial Board for IBCAO is expected to take place in Canada, November 1998.

International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA)

The Sixth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA) took place in Cartagena, Colombia, 18-20 November 1996. Significant progress was achieved in 1997. The compilation of all sheets is now completed. Two Sheets of this series (1-04 and 1-09) have been published and placed on sale. These sheets have also been digitized and incorporated into the digital database. Since the capacity to generate new products based on these sheets now exists, the latter are therefore ready to be sent to GEBCO Digital Atlas Manager for incorporation into the GEBCO Digital Atlas (GDA). Other sheets are being

scanned and vectorized, as production progresses. Guidelines for documenting and despatch of digital files have been developed and distributed to all IBCEA members. In view of the expanding digital database, the Editorial Board is interested in developing new products derived from the IBCEA such as Digital Torrain Models, Virtual 3-D Charts and colour maps using chromostereoscopy. A 3-D colour of the bathymetry of sheet 1-01 has been created with vectorized contours, using a cartographic programme, the General Mapping Tool (GMT). A decision to initiate production of geophysical and geological maps based on the IBCEA bathymetric base map series has been reached. Discussions are being held with appropriate and interested national organizations, and it is foreseen that compilation of such series will start shortly. The next session of the IOC Editorial Board for IBCEA shall take place in Caracas, Venezuela, April 1998.

International Bathymetric Chart of the Central Eastern Atlantic (IBCEA)

The Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Central Eastern Atlantic (IBCEA) was held in Paris, France, 9-11 October 1996. In spite of a lot of difficulties, some progress was achieved within this project. At this meeting, France, through SHOM, accepted to proceed with the revision of Sheets 6, 8 and 9 according to technical recommendations agreed upon at this meeting. Sheet 8 was completed in December 1997 and presented to the Editorial Board. Revision of Sheet 6 is expected to be completed by January 1998. Revision of Sheet 9 and remaining work on the other sheets will be continued. Very few new data have been received and integrated. Gravity data have been used and the bibliographic study for the first three sheets has been completed. In 1998, the SHOM expects to publish Sheets 6, 8 and 9 upon receipt of the Editorial Board agreement, and then to start preparation of Sheets 10, 11 and 12. The Third Session of the Editorial Board for IBCEA is planned to take place in Dakar, Senegal, October 1998.

International Bathymetric Chart of the Mediterranean and its Geological and Geophysical Series (IBCM)

An informal consultation of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological and Geophysical Series (IBCM) was held on board Russian R/V ASibiriakov@ in Monaco, 19-20 April 1997, during the XVth International Hydrographic Conference. Progress has been achieved in the Geological and Geophysical Series within which the Unconsolidated Sea-bed Surface Sediment Chart was printed in July 1997. Preparations for printing the Magnetic Anomalies Chart, the last one of the Geological-Geophysical series, are now completed. The proof color of this chart should be presented for consideration to the next session of the IOC Editorial Board for ICM in Dubrovnik, June 1998, during the XXXVth CIESM Congress.

International Bathymetric Chart of the Western Indian Ocean (IBCWIO)

The Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean (IBCWIO) took place in Simon´s Town, Republic of South Africa, 6-10 October 1997. For the first time, representatives of South Africa participated in a session of the Board. It was also appreciated that France and Madagascar confirmed their commitments as members of the Editorial Board and attended the session. The Editorial Board reviewed the Terms of Reference which were adopted at its First Session. Since the last report, the project made significant progress: the data collection has been completed. It contained GEODAS 3.1 and some additional surveys. The data belonging to the different charts of IBCWIO have been plotted on paper sheets and collected in digital form on CDs. Paper sheets and CDs were sent to the concerned voluntary collaborators in the region. The National Geophysical Data Center, Boulder, USA, is now publishing new data through Internet. It was agreed that UK, USA, France and Germany would provide support to countries not in a position to use this information directly. In 1997 and 1998 the drawing of depth contour lines will be done. After preparation of the 1:1 million scale sheets and their review by the Chief Editor, they will be submitted to a scientific expert for final revision. The first chart of IBCWIO is expected to be printed in Summer 1999. The next session of the Editorial Board will take place in 1999, after printing of the first chart.

International Bathymetric Chart of the Western Pacific (IBCWP)

The Second Session of the IOC Editorial Board of the International Bathymetric Chart of the Western Pacific (IBCWP) took place in Bangkok, Thailand, 8-13 December 1996. In 1997, very important progress was achieved within the IBCWP project. In Sub-region 1, Russia has provided 1:500,000 compilation sheets which contained corrected regular survey data and track lines, as well as overlay contour sheets. In Sub-region 2, four sheets of bathymetric charts have been published by Japan, and it is planned to revise them into two sheets in accordance with the specifications of the IBCWP.

With regard to the Sub-region 3, several achievements have been made. Extensive data have been collected by China in the East China Sea and the South China Sea. Malaysia and Vietnam have prepared plans for producing

some maps in the sub-region. Philippines is going to collect and sort out their bathymetric data, and plans to prepare plotting sheets and provide their bathymetric data to the Editorial Board. Australia, the responsible country for Sub-region 4, has actively implemented the project in the area, including data collection into its database, compilation of bathymetric maps on a scale of 1:250,000 and has studied the implications of the UN Convention on the Law of the Sea for this project. Since the Second Session of the Editorial Board, co-operation with other countries and organizations interested in the project, such as SOPAC, was established. The Third Session of the Board, combined with a digital bathymetry workshop, shall take place in Boulder, Colorado, September 1998.

1.5 MARINE POLLUTION RESEARCH AND MONITORING

The activities that have been accomplished have been conducted not only within the context of the interests of all the co-sponsoring agencies but also other agencies (e.g. NATO) and programmes (e.g. GEF) having collaborative linkages. Considerable support has been given to the Black Sea regional programme.

In an effort to be responsive to Member States= needs, a questionnaire was prepared and sent to Member States as an enclosure to IOC Circular Letter 1843. The responses that were received were extremely useful and are providing a basis to re-tune the programme, where necessary, and could be the first order of business for the individual who will fill the P-5 post as Head of the Marine Pollution section of the IOC Secretariat. However, it should be noted that the total number of responses to the questionnaire received by IOC, which was eight; was disappointing. The responses received by UNEP and IMO, co-sponsors of GIPME, was zero. This poor response to the questionnaire was one reason the Nineteenth IOC Assembly adopted a resolution (i.e. Resolution XIX-4) Aencouraging direct contacts between GIPME Officers, the IOC Secretariat and national experts on matters relating to the GIPME Programme and the implementation of pilot projects of the Health of the Ocean Module of GOOS, subject to the provision that the National Action Addresses be routinely updated and informed of such direct contacts and topics of discussion@.

The GIPME Officers convened their annual meeting at IMO Headquarters in May 1997, one result of this meeting concerned contact points in the regions and a desire to improve the responses from Member States to such things as the questionnaire noted above. A request was made to allow for direct contact with national experts and a further input to having the resolution noted above adopted.

Another request arising from the GIPME Officers= Meeting was to revise the modus operandi of the experts working within the GIPME Programme. That is, discontinue formal meetings of the three GIPME Groups of Experts (i.e., GEMSI, GEEP and GESREM), coalesce these groups into a GIPME Expert Scientific Advisory Group (GESAG) which will meet periodically to address particular topics or sets of topics placed before the GIPME Programme by its co-sponsors and/or the various regional groups. This restructuring was adopted through Resolution XIX-4. This action reduces from three to one the subsidiary bodies in GIPME, and automatically caters to a cross-disciplinary approach to solving problems put before the programme and/or providing advice, realizing some savings in the programme and last but not least recognizes the new working arrangement which has been carried out over the past three years.

The IMO requested GIPME advice on ship ballast water issues. These issues are of concern not only with analytical and technical aspects of the problem, but human health as well. The approach taken is to provide input into the IMO-ICES-IOC Study Group on Ballast Water and Sediments, from the GESAG on the analytical and technical side of the question, and to address the human health issues in the Health of the Ocean Panel. This was done at its last session in Singapore in October (see the section on GOOS for further information). This is yet another example of how GIPME and the HOTO Panel interact.

Another GIPME activity was to convene a workshop on Sediment Quality Guidelines at IMO, London, May 1997. Discussions on this topic are applicable in a number of programmatic areas, not the least of which is Land-Based Sources of Marine Pollution as described in the Global Plan of Action to protect the Marine Environment against Land-Based activities, for which UNEP is the lead organization. This is not a subject where one meeting can provide a basis for making definitive recommendations or conclusions. This is because in order to reach a conclusion or make a recommendation regarding sediment quality, the interaction among the marine biological, toxicological and chemical properties must be identified and interpreted holistically. Sediments and their role in ecology are notably complex and a conclusion or recommendation on the quality of any sediment must be based on a preponderance of technical and scientific evidence from an integration of the physical, biological and chemical attributes or properties.

A mission was undertaken by GIPME experts to Costa Rica (June 1997) to begin development of a training/research workshop on the persistence of pesticides and their biological effects. There is concern, especially in tropical regions, of the effects of non-persistent pesticides in coastal areas. Little is known about the persistence and effects of these chemicals on aquatic organisms. The primary aim of the planned workshop is for training to be provided in appropriate methods for assessing the nature and scales of any associated problems. Details are in the

process of being worked out and the workshop is planned for the Autumn 1998.

Another mission was undertaken by the Chairman and Vice-Chairman of GIPME to the WESTPAC Region in March-April 1997. This mission involved having discussions with government officials and scientists in Thailand, Singapore, China, the Republic of Korea and Japan. These discussions resulted in identifying a number of actions that should be taken which would significantly enhance the actions of the GIPME Programme, provide for the implementation of several pilot projects dealing with the Health of the Ocean Module of GOOS and assist in the implementation of the next phase of the International Mussel Watch Project. This mission also resulted in re-emphasizing the importance of undertaking such fact finding endeavours.

Action was initiated to convene an International Symposium on Marine Pollution under the co-sponsorship of IAEA, IOC, UNEP, IMO and CIESM, in Monaco, October 1998, as part of Year of the Ocean activities. GIPME Officers play a major role in the organization and implementation of this symposium.

It has been decided to convene a meeting of the GESAG at the very end of 1998. Based on the Scientific Advisory Group meeting, the GIPME-IX will be planned and dates set.

On a regional basis the GIPME Programme has advanced rather well. The Marine Debris and Oil Pollution component of the CEPPOL Programme is continuously managed by the IOCARIBE. The University of Puerto Rico is co-ordinating a major intercomparison study for eight different sites in the Caribbean. The Oil Pollution component is being co-ordinated by IMA of Trinidad and Tobago and encompasses a continuation of the efforts to establish a thorough data bank on fingerprinting of crudes as well as to establish a model on movement..

During 1997 a synthesis of the CEPPOL Programme was carried out by Stefan Andersson and Enrique Mandelli in order to provide member states with an assessment of this major pollution prevention programme which was initiated in 1990 as a joint IOC- UNEP Programme, triggered by the presence of both organisations in the Caribbean, where IOC has provided the scientific input to the management competence of UNEP. It was published as an information document to the IOC Assembly.

In the IOCEA region the Marine/Debris Waste Management project has continued according to the plan as established in 1994. Togo has also joined the original group of five. In addition to the monitoring a report on waste management practises in the harbours has been carried out in order to provide the project with an assessment a basis for an awareness campaign on marine debris.

Four contracts have been issued with Member States of IOCINCWIO in order to initiate a long term base-line monitoring of coastal water quality. The first component to be monitored is Nutrients in addition to basic parameters, such as salinity, turbidity, temperature, and PH. The monitoring will in short term be extended to include, heavy metals and oil. In addition, the marine debris/waste management project for East Africa has been initiated, drawing on the experience from the IOCEA region. The first workshop is being planned for in mid-1998.

Also within the GIPME as well as the GOOS Programmes, IOC/IOCARIBE is probing the possibilities to collaborate further with the private sector. A plan for the first workshop to be convened in Cartagena, Colombia in September 1998 has been developed. The project is at this initial stage striving to find the means for mutual co-operation between IOC operational programmes and the oil, shipping and tourism sectors of the Caribbean.

1.6 PROGRAMME ACTION RELEVANT TO COASTAL AREA MANAGEMENT

1.6.1 Decisions of the 19th Session of IOC Assembly

1997 marked a breakthrough in the continuous efforts of IOC to support the development of integrated coastal area management. The IOC Assembly at its 19th session (Paris, July 1997) decided, through Resolution XIX-5, to:

(i) Acontinue to expand the IOC activities in relation to ICAM based on the recommendations of the IOC Group of Experts on coastal Zone Activities, as well as those which are derived from various workshops, seminars, symposia, etc., in particular the Dalian workshop (May 1997) on science integration into ICAM;

(ii) establish a harmonized and focussed interdisciplinary coastal zone programme drawing upon, e.g. GOOS, OSNLR, and other existing IOC as well as UNESCO programmes, but distinct from the existing IOC programmes, with separate funding; and

(iii) include A Marine Science Inputs to ICAM@ as an Agenda Item of future meetings of the IOC Governing Bodies, as a forum for policy discussion on coastal zone issues, so as to ensure interdisciplinary and inter-sectoral interaction and well-co-ordinated administration at various levels.@

The Assembly also instructed the Executive Secretary IOC to designate a co-ordinator in the IOC Secretariat as soon as possible to look after the implementation of IOC activities devoted to ICAM, to ensure co-ordination and interaction between various IOC programmes and those of other organizations, as well as between marine scientists and experts in socio-economic and cultural aspects.

1.6.2 Follow-up Actions to Resolution XIX-5

As a follow-up to Resolution XIX-5, an IOC Co-ordinator on Integrated Coastal Area Management has been appointed by the Executive Secretary IOC. A strategy concerning IOC Programme on Marine Science Inputs to the Integrated Coastal Management is being developed. The objectives of the Programme are to address coastal zone problems through activities of more cooperative, coordinated and interdisciplinary nature, and ensure good coordination among existing IOC efforts related to the coastal zone. This programme also aims to provide a mechanism to promote interaction between IOC programmes related to ICAM and those of other international organizations, between marine natural scientists and social scientists, as well as between scientists and coastal managers and policy makers. Proposed potential core projects under this Programme include:

(i) Multidisciplinary Study of Coastal Process for ICAM. This Project aims at promoting multidisciplinary studies of coastal processes with a view to providing more reliable and interpreted data to serve the need of coastal management, both at global and regional levels;

(ii) Marine Scientific and Technological Information System for ICAM. Two proposed activities include the development of an Internet information system on marine science and CD-ROM marine science datasets in support of ICAM;

(iii) Methodology Development in support of ICAM. Under this project, focus is given to the development of guidelines for coastal scientists and managers, with a view to enabling them to effectively contribute to the integrated coastal management, including possible standardized methodologies to translate science into decision-making for ICAM. This would also include the development of marine scientific evaluation methods as part of the overall ICAM evaluation exercise.

(iv) Coastal Monitoring Systems for ICAM. This project aims at integrating the existing coastal monitoring systems, such as coral reef monitoring initiative, remote sensing initiative, sea-level observation, mussel watch, baseline studies, coastal erosion monitoring, and coastal module of GOOS, in support of the integrated coastal management; and

(v) TEMA in Marine Science for ICAM. This project will underpin all the above projects and emphasize two types of activities: (a) short-term workshop course/workshops, including training workshops on science/policy and specialized technical training courses; and (b) Distance learning courses.

(vi) Public Awareness in ICAM has been proposed as an integral part of the IOC Programme on ICAM.

In addition, an assessment of scientific needs for capacity building in ICAM is also proposed to be conducted by an interdisciplinary group of experts as a basis of designing and developing the above - mentioned projects and related activities. Implementation mechanism and cooperation with other international organizations, academical institutions and donor agencies are also under consideration.

1.6.3 IOC Activities in Support of ICAM

Though IOC=s coastal zone related activities could date back to the early days of its establishment, its effort dedicated to the integrated coastal management through marine science and ocean observation inputs was initiated in the implementation of UNCED decisions, and Agenda 21 in particular. The establishment by the 17th session of IOC Assembly (March 1993) of an interim IOC Group of Experts on Coastal Zone Activities, charged with the responsibility of preparing a comprehensive report outlining the needs for research, monitoring, assessment and services to support ICAM, was the first of a series of IOC initiatives in the field of integrated coastal management. The Document IOC/INF- 987 (1995) provides some information on the IOC activities since UNCED and particularly during 1994-1995, and IOC/INF-1051 (1997) provides a summary of the IOC coastal zone activities during 1996-1997.

(i) IOC ICAM Activities in 1996

1996 was marked by a number of workshops on the subject of coastal area management in various regions, and particularly in Africa. Among them, the IOC-World Bank-Sida/SAREC Workshop on Integrated Coastal Management, held in Nosy Be, Madagascar, November 1996, and IOC Regional Workshop on Coastal Oceanography and Coastal Zone Management, Comores, Moroi, 16-20 December 1996, are the two most recent efforts of the IOC in the field of integrated coastal management in the east African region. While the former focussed on using ICAM concept in identifying gaps of the east African region in terms of institutional arrangements and mechanisms for co-ordination and implementation of ICAM-oriented activities, the latter stressed the coastal oceanographic and management issues of the small island developing States of the Indian Ocean, including Comores, Mauritius, Seychelles, Réunion (France) and Madagascar.

As an example of cooperation with UNESCO CSI Programme, IOC and CSI co-sponsored a workshop on AIntegrated Framework for the Management of Beach Resources within the Smaller Caribbean Islands was held in Puerto Rico, 21-25 October 1996. The workshop brought together coastal planners and environmental scientists, as well as educators, researchers and members of the private sector for the Wider Caribbean region and focussed on information exchange, network strengthening and coordination of further planning.

The table below provides a summary of the IOC activities in the integrated coastal management in 1996.

Table: IOC ICAM Activities in 1996

:

Activity	**Dates**	**Place**
Publication of GESAMP Reports and Studies No.61: Report on Science Contribution to IOC co-sponsored the Report)	1996	Rome
International Seminar on the Coastal Zone of West Africa (IOC provided financial support to participants)	25-29 March 1996	Acccra, Ghana
Training Workshop on Beach Management in the Mediterranean and Black Sea Region (IOC co-sponsored the workshop)	11-17 May 1997	Malta
International Conference ACoastal Zone Canada 96" (IOC provided financial support to participants)	12-17 August	Canada
The workshop on A Integrated Framework for the Management of Beach Resources within the Smaller Caribbean Islands (IOC co-sponsored the workshop)	21-25 October 1996	Puerto Rico
IOC and LOICZ co-sponsored International Workshop on Continental Shelf Fluxes of Carbon, Nitrogen and Phosphorus	14-18 October 1996	Lagos, Nigeria
IOC-World Bank-Sida/SAREC Workshop on the Integrated Coastal Management (IOC co-sponsored the workshop)	November 1996	Nosy Be, Madagascar
IOC Training Programme in Coastal Marine Science: Modelling and Monitoring of Coastal Marine Process	November 1996	Dehli, India
IOC Regional Workshop on Coastal Oceanography and Coastal Zone Management	16-20 December 1996	Comores, Moroi

(ii) IOC Activities in Relation to ICAM in 1997

IOC activities in the integrated coastal area management expanded in 1997 both in terms of variety and depth, with a great deal of emphasis on the contribution of marine science to the integrated coastal area management.

1. Multidisciplinary Studies in Support of ICAM

The peerview of the two volumes on Coastal Oceans: A- Processes and Methods; and B- Coastal Regions, as a result of COASTS first workshop in Liège, May 1994, has been completed and sent for printing. These volumes

will help increase the understanding of coastal processes in eastern and western boundaries, the Arctic regions and semi-enclosed seas. The goal of the COASTS would be to provide a sound scientific database for integrated coastal management.

The Gulf of Thailand Study, an integrated scientific interdisciplinary studies aimed at solving practical problems in integrated coastal management has completed two cruises, as a result of which, the IOC Workshop on the Co-operative Study on the Gulf of Thailand was held in Bangkok, 25-28 February 1997. The issues addressed by the workshop include: oceanographic conditions, existing scientific understanding, salt and heat budget, existing data and information and their management, as well as the best mode of international cooperation.

b. Manuals and Guidelines

Guide Méthodologique d=Aide a la Gestion Intégrée de Zone Côtière, co-sponsored by IOC and UNESCO programmes IGCP, MAP and IHP, has been published by France in July 1997. Drawing upon case studies in different locations of France as well as in various countries of west Africa, this Guide is focussed on the development of scientific approaches and methodologies with regard to integrated coastal management. This Guide will be translated into English in 1998.

Guidelines for Assessment, Monitoring and Management of Physical Shoreline Changes for the Western Indian Ocean Region has been prepared by the IOC/OSNLR Project on Coastal Erosion. More detailed information is provided under section 5.3: IOCINCWIO.

IOC has also published the book on Coastal Zone Management Imperative for Maritime Developing Nations in 1997 and the book on Integrated Coastal and Ocean Management: Concepts and Practice has been sent for printing and will come out in early 1998.

. c. TEMA in ICAM

Workshops and training courses have been held in various regions over the past year, with focus on different aspects of ICAM.

In the western Pacific region, two workshops have been organized. The IOC-SOA International Training Workshop on Integration of Marine Sciences into the Process of ICAM, was held in Dalian, China, 19-24 May 1997. IOC, SOA and Sweden (SIDA/SAREC) contributed to the financing of the Workshop. The Workshop focussed on science/policy interaction in the process of integrated coastal management. This is IOC=s first effort of this kind on a regional level, with a view to promoting interaction between scientists (natural and social) and coastal managers/policy makers. A particular aim is to demonstrate the important role of science, particularly marine sciences, in different phases of integrated coastal management. Among others, the workshop recommended that a common approach toward ICAM should adopted by donors, and consistency and coordination should be ensured at the national level by the international organizations in their implementation of the IOC mandate derived from various treaties as a result of UNCED. The workshop also recommended that IOC should establish a clearing house mechanism in ICAM activities, and an IOC workshop on science/policy interaction should be based on the Dalian workshop and held in other regions.

A Regional ICAM Training Workshop was held in Seoul, the Republic of Korea, October 1997, with emphasis on ocean survey, data collection and institution building in the development and operation of the integrated coastal management.

A cooperative relationship has been established with the German 10-month Training Course on Protection and Utilization of Oceans (Germany, January - October 1997) where IOC was invited to give lectures on marine science and its inputs to the integrated coastal area management.

The Training Programme in Modelling & Monitoring of Coastal marine Processes (MAMCOMP), sponsored by IOC, was held in Dehli, India, November 17-19, 1997, with focus on the such themes as coastal pollution problems, coastal marine environment, coastal transport models, environmental hazards, and integrated coastal management: concepts and national experiences.

The international training workshop on AIntegrated Coastal Management@ was held in boston, USA, from July 20-21 1997. This was the fourth in a series of training workshops (Long Beach >91, New Orleans >93, Tampa > 95). Through panel discussions on progress of international ICAM initiatives and responses to international ICAM initiatives, case studies, and field trip, the workshop reviewed progress in implementation of Chapter 17 of Agenda 21, compared experience associated with ICAM at both national and local levels and introduced approaches to ICAM that address a range of issues. The participants also visited a local level example of efforts to promote integrated

coastal management.

1.6.4 Preparation for 1998 International Year of the Ocean

A number of ICAM activities forming an integral part of IOC overall programme in celebration of the 1998 International Year of the Ocean, have been planned. Preparation of the these activities are well under way. These activities include:

(i) Korea ICM Workshop=98, in Seoul, Korea, 16-18 April 1998;

(ii) IOC-SOA International Workshop on the Integrated Coastal Area Management and Sustainability of Coastal Mega-Cities in the Asia-Pacific, Shanghai, China, 20-22 April 1998;

(iii) Regional Workshop on Information and Data Requirement for Coastal Zone, in Mombasa, 6-10 May 1997;

(iv) International Conference on Education and Training in Integrated Coastal Area Management (ICAM) - The Mediterranean Prospect, in Genoa, Italy, 25-29 May 1998

(vi) Pan-African Conference on Sustainable Integrated Coastal Management (PACSICOM) in Maputo, Mozambique, 18-25 July 1998.

2. OCEAN SERVICES

2.1 OCEANOGRAPHIC DATA MANAGEMENT (IODE)

The IOC Committee on IODE at it=s Fifteenth Session (23-31 January 1996, Athens, Greece) formulated the IODE Work Plan for the intersessional period until the year 2000. The first two years of the Work Plan were included in Annex 2 of the Resolution EC-XXIX.1 approved by the Twenty-Ninth Session of the IOC Executive Council (24 September - 2 October 1996, Paris, France).

In 1997, the focus of activities was on the increased use of technology for data and information exchange and dissemination and on the expansion of a comprehensive TEMA programme.

We succeeded to preserve, for the time being, jointly with other international agencies, particularly ICSU and WMO the main principle of free and open exchange of oceanographic data in spite of attempts made by few countries, organizations and industry through the World Intellectual Property Organization (WIPO) to sign the database treaty. This treaty if signed, could have major negative effects for science, technology and education by establishing a barrier to the free access of data which are likely to be amplified in a developing country environment.

The Ocean Data Symposium (Dublin, Ireland, 15-18 October 1997) was a key event for the IODE programme among other activities targeted to upgrading the skills of data centres and increasing knowledge of marine data managers. It brought together scientists, data managers and industry to a forum where the common need for marine data was the theme. It dealt with all aspects of marine data collection, methodologies, instrumentation, analysis techniques, as well as data archaeology, dissemination, storage, retrieval, exchange and management. It addressed 4 main themes:

- The data and metadata requirements of scientists in order to support ocean research;
- The benefits of statistical techniques and numerical modelling for analysis and prediction;
- Development of advanced technology for data collection, analysis and exchange;
- Advances in information and data management tools for policy and decision makers.

Its objective was to assess the data management requirements of end-users (scientists, data managers and industry) and to investigate the application of technological advances in order to increase the efficiency and effectiveness of present data management methods.

The conclusions of this Symposium will be passed to IODE, as well as other relevant bodies to improve the response to users of international data and information systems.

Co-joint with the Dublin Symposium, the seventh Session of the IODE Group of Experts on TADE (GETADE)

was arranged under the auspices of the National Oceanographic Data Center of Ireland (15-18 October 1997). The Group reviewed the IGOSS/IODE Data Management Strategy. It noted that in the context of IODE, as well as the emerging GOOS, GETADE is not realizing its potential. There is a need to heighten GETADE=s profile and translate its decisions into actions more expeditiously. The user community needs to know that there are groups like GETADE working to resolve technical issues. The Group noted as an initial priority the G3OS joint metadata project and the participation of GETADE in this activity especially with regard to the technical aspects of catalogue inter-operability. Other priorities are OceanPC, and the formats issue. The Group noted the close relation between TADE and MIM, especially with regard to the G3OS metadata project and the need for close co-ordination in the provision of a distributed system capability.

Formats continue to be a serious problem with which little progress appears to have been made. Data delivery is a concern of both the data user and supplier. IODE and GETADE can improve data exchange by providing information, and establishing a framework to enhance data and information exchange. There is no single way to overcome this problem. One approach is to continue to publish manuals and guides that describe data management procedures. The TADE format should be made more widely available so that users interested in knowing how to format data would receive some guidance. It was also noted that the distinction should be clearly made between an exchange format and a data management format. The medium for providing this information should be through IOC TADE WWW pages.

OceanPC is a key area of development with the objective of making data available to clients at all technical levels. Noting the importance of the Internet, the Group recommended that OceanPC use the Internet for those things that it is good for and other media (e.g., CD-ROM, DVD) where they are appropriate. So, where appropriate, OceanPC could provide links to web pages where data or information exist that supplement its functions. Likewise, where CDs exist that contain valuable data sources for OceanPC, tools need to be available in the project to read the data on the CDs.

The Group noted that the advent of Data publishing will increase the profile of IODE and data management in general. It would encourage the production of Atlas= and data collections.

The Joint IOC/WMO Global Temperature-Salinity Profile programme (GTSPP) continued to improve its activities during 1997 by including new sources of data and providing additional services to the WOCE Experiment (Figure 2.1.1). New data types that have been added to the data flows include data from towed undulating instruments and from floats. GTSPP has also produced datasets on CD-ROMs for a series of WOCE workshops. The GTSPP CD-ROM is being updated for the use by the WOCE Data Products Committee in developing a final WOCE archive.

The GTSPP Project Plan has been updated and adjusted to new requirements of the GTSPP programme and will be published at the beginning of 1998.

The implementation of the first phase of GODAR came to a final stage. The Sixth and last regional GODAR workshop took place for the Member States of Western Africa in Accra, Ghana, 22-25 April 1997. We succeeded in really having global coverage in GODAR implementation by bringing to the regional workshops more than 200 experts from almost 60 countries (Figure 2.1.2). A new release of GODAR products is expected at the end of the 1997 which will contain an additional 600,000 temperature profiles, 100,000 salinity profiles, 120,000 chlorophyll profiles and 600,000 plankton observations, as well as smaller amounts of other parameters, such as nutrients. The first phase of GODAR considerably enriched the WDCs, Oceanography data archives (Figure 2.1.3). However, the volume of rescued data constitutes only a small percent of all data holdings which have been identified during regional workshops. It is expected that the Global GODAR Conference, which is now planned for the second half of 1998, will summarize the experience gained during the first phase and identify objectives for the second phase. The first step in receiving big volumes of data have already been made through bilateral and regional agreements, e.g., with the Russian Federation or with the Member States of the Mediterranean and Black Seas. In May, a meeting was arranged in Istanbul, Turkey which brought together representatives of 17 countries of the Black and Mediterranean Sea. The product of this meeting was a project proposal on GODAR-type regional study, known as MEDAR/GODMED. The project proposal is now with the European Community for funding approval.

It is the general understanding within the IODE system, that without expansion of its services to new data types, the system will not be able to meet effectively the needs of the marine scientific community and other users. During 1997, special emphasis has been made on data collection and management from the coastal zone and on data collected by remote sensing methods. The development and management of programmes designed to achieve ecologically and economically sustainable utilization of coastal and marine resources are major challenges for small island developing States. The lack of an integrated approach to coastal and marine area management, as well as a lack of necessary data, has limited the effectiveness of past and present management measures which is increasingly resulting in coastal habitats being degraded through pollution, natural resources being over exploited and growing conflicts between competing resource uses.

The IOC Committee on International Oceanographic Data and Information Exchange (IODE) at its Fifteenth Session (Athens, Greece, 23-31 January 1996):

> *Areviewed the requirements for coastal data from LOICZ, as well as other coastal programmes. It noted that much more work was necessary within IODE to begin to address the variety of data types found in the coastal zone.@*

The IODE Committee:

> *Aagreed that one area where IODE could contribute, was in creating an inventory of marine data already available in the coastal zone. It could provide standards for the archiving collection and processing of coastal datasets, utilizing such resources as OceanPC and the IODE QC Manual.@*

The IOC requested Member States and NODC=s to identify coastal datasets and submit their inventory of coastal marine data to the IOC Secretariat for compilation. The listing included but was not be limited to: data type, location, contact point, accessibility (on/off line) and volume. It was noted that the space agencies flying ocean colour sensors are already asking for coastal data to support sensor validation activities. Water colour, water reflectance and Chlorophyll-a datasets are of particular interest and recommended to be included in national inventories. Many responses have already been received to this request and the results will be compiled during 1998.

Although the system of the IODE data centres has a global coverage, there are still big gaps in the network of data centres (Figure 2.1.4). To close one of the gaps, a joint ROPME/IOC mission was arranged to the Persian Gulf area in March 1997. The mission visited 6 countries in the region, namely, Bahrain, Kuwait, Qatar, Oman, Saudi Arabia and the UAE, and formulated recommendations on the ways of establishing the IODE infrastructure in the region. We may expect that in the coming one-two years, there will be visible progress achieved in the marine data and information management in the region. The nomination of the IODE Regional Co-ordinators announced in the IOC Circular Letter of 18 August 1997 for 9 geographical areas will help in facilitating the IODE Programme. Publication of the revised version of the IOC Guide on the NODC establishment (IOC Manuals and Guides No. 5, revised, 1997, UNESCO) will also formulate interest.

As before, much time and energy have been devoted to the capacity building activities. Four regional training courses have been arranged under the auspices of the IODE data centres in Tokyo, Japan for the WESTPAC countries (13-24 October 1997); in Gelendzik, Russian Federation for the countries of the Black Sea and Caspian Sea on Geophysical and Geological Data Management (8-19 September 1997) jointly with the EU/MAST and IAEA; in Tehran, Islamic Republic of Iran, for the countries of the Persian Gulf and Caspian Sea (18-30 October 1997), jointly with ROPME; in Mombasa, Kenya for IOCINCWIO countries (1-11 December 1997). More than 50 experts had an opportunity to attend courses and improve their knowledge in different fields of marine data and information processing. Unfortunately, IODE was not able to acquire long-term fellowships for training experts in the leading data centres, as it was originally planned.

To help developing countries in data management OceanPC project is steadily developing. The OceanPC package in its present form is a loosely bound set of utility programmes that enables the user to navigate data into digital form (from hard-copy) and subsequently to quality-control them in a series of routines written for standard hydrographic (water chemistry) properties. Additional routines allow analysis (primarily graphic viewing). The goal of the OceanPC project management team is to re-write the software as a 32-bit Windows-compatible code, to add a generalized interface that allows many more formats to be imported and exported, to manage the data internally with a relational database engine (e.g., Access or Paradox), to include satellite imagery functionality, to include time-series data, to include a wider range of useful metadata formats for cataloging data files, and to include linkages to Web-based data. IODE continues to place high priority on this project and continues to pursue funding opportunities for this important activity.

2.2. MARINE INFORMATION MANAGEMENT

2.2.1 Introduction

In line with the rapid development of the Internet through the world, the IOC=s activities in Marine Information Management during 1997 have focussed on the development of programmes, products and services with the aim of improving access of scientists to marine information and data. The core parts of the MIM programme were: (i) further development of regional information exchange networks in Africa; (ii) networking with the marine information management community; (iii) further development of the IOC WWW server with special emphasis on services.

2.2.2 Regional Networking

2.2.2.1 RECOSCIX-WIO

RECOSCIX-WIO-II (January 1996 - March 1999) has continued the ›traditional‹ information services developed under RECOSCIX-WIO-I (query handling, document delivery) but has also started the development of information and data products: the first RECOSCIX-WIO CD-ROM. This product contains a copy of the IOC WWW server, WIODIR (Directory of Marine Scientists for the IOCINCWIO region - extract from GLODIR-), extensive bibliographies (extract from ASFA). The IOC has provided complementary support for the operational activities of RECOSCIX-WIO. The IOC also assists with the production and distribution of the regional newsletter WINDOW (Western Indian Ocean Waters).

The 4th Session of IOCINCWIO (see section 5.3) gave the RECOSCIX-WIO project a clearly expanded mandate to include both information and data in its terms of reference. Accordingly comprehensive data sets related to the IOCINCWIO region have been included on the CD-ROM.

To complement the Belgian support the IOC has provided annual subscriptions to bibliographic databases (including ASFA) to University of Asmara (Eritrea), Moi University (Kenya), Centre de Recherches Océanographiques CNRO (Madagascar), Institut Halieutique et des Sciences Marines IHSM (Madagascar) and University of Dar Es Salaam (Tanzania). The IOC and Belgium support together ensured that most countries in the region now have in-house access to ASFA.

In order to reinforce institutional capacity to efficiently communicate at the regional and global level the IOC has provided support for Internet access to RECOSCIX-WIO Regional Dispatch Centre & Kenya Marine and Fisheries Research Institute (Kenya), Centre de Recherches Océanographiques CNRO (Madagascar), Institut Halieutique et des Sciences Marines IHSM (Madagascar), Mauritius Meteorological Service (Mauritius), Instituto de Investigaçao Pesqueira IIP (Mozambique), Instituto de Hidrografia e Navegaçao INAHINA (Mozambique), Seychelles Fishing Authority SFA (Seychelles) and Institute of Marine Sciences IMS (Zanzibar, Tanzania).

2.2.2.2 RECOSCIX-CEA

A comprehensive project proposal was prepared by the IOC and submitted to the Belgium Government (Flemish Community) entitled ›Oceanographic Data and Information Network for Africa ODINAFRICA). The project aims to develop data and information management capabilities in both the IOCINCWIO and IOCEA regions. Development of RECOSCIX-CEA (Regional Co-operation of Scientific Information Exchange in the Central Eastern Atlantic) is part of the aims of ODINAFRICA. The project has been approved by Belgium within the UNESCO-Belgium (Flemish Community) framework agreement, to be signed in January 1998.. The project implementation is planned to start in the first semester of 1998.

2.2.3 Networking with the marine information management community

In order to ensure that the Marine Information Management programme responds to today‹s needs of marine information managers around the world, efforts have been continued to develop closer links with special interest groups such as IAMSLIC (International Association of Aquatic and Marine Science Libraries and Information Centres) and EURASLIC (European Association of Aquatic Sciences Libraries and Information Centres). In 1997 support was provided to libraries and information managers from Barbados, Palau, Kenya and South Africa to participate in the IAMSLIC 1997 Annual Conference. This year‹s conference included a one-day workshop on metadata management (with the participation of the IODE Chairperson).

2.2.4 WWW-based Information Services

In 1997 substantive work has been undertaken to further develop the server with the aim to: (i) provide detailed information on IOC activities and, to show the partnership philosophy of the IOC, with links to relevant web servers in Member States; (ii) provide products and services to the marine science community. It is hoped that the IOC WWW server can become a ›gateway‹ to marine science information and data around the world.

Due to lack of funds and other resources it was decided to terminate the production of the printed multilingual IMS Newsletter and to henceforth use the IOC WWW server for dissemination of ocean related news items. Accordingly the Oceans Newsroom was renamed ›IMS Newsletter on-line‹:
URL: **http://www.unesco.org/ioc/news/newsroom.htm**

The number of visits to the server has increased during 1997 from 3297/month in January 1997 to 23545/month in December 1997 (Figure 1). This clearly shows the importance of the WWW as a tool for creating awareness about the IOC and its activities, as well as for disseminating information to the Member States, the marine science community and anyone else interested in ocean science and services.

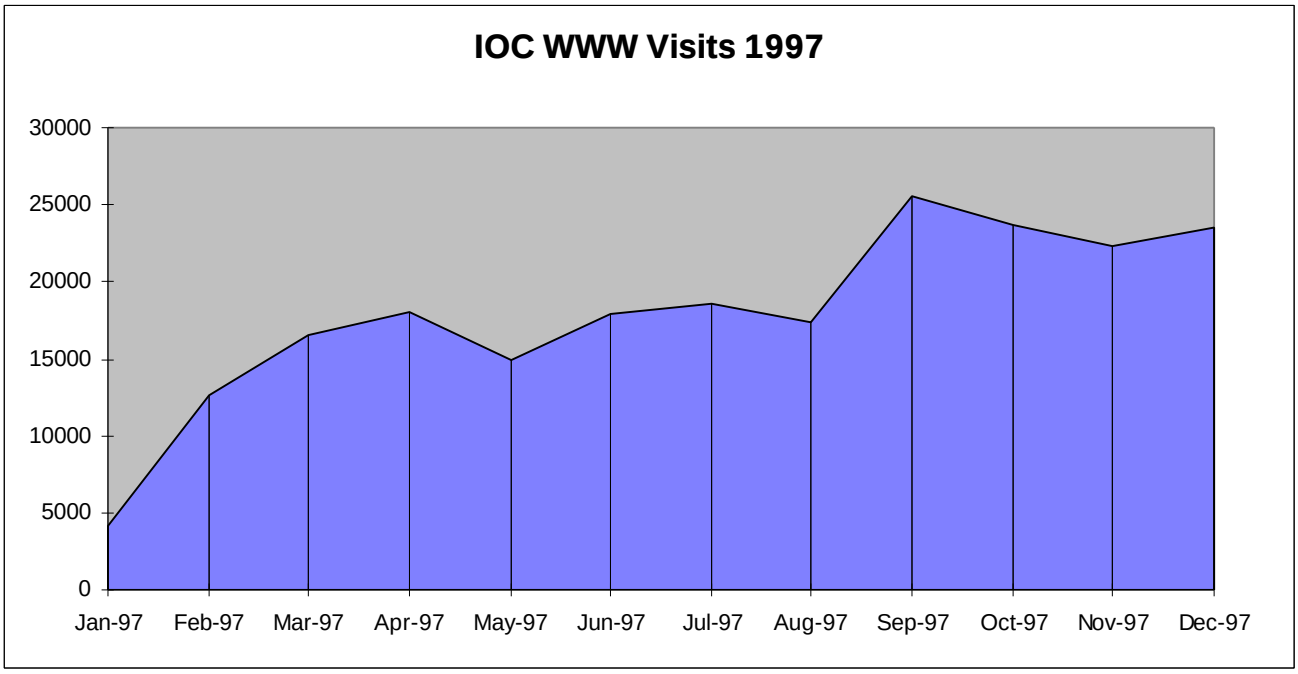


Figure 1

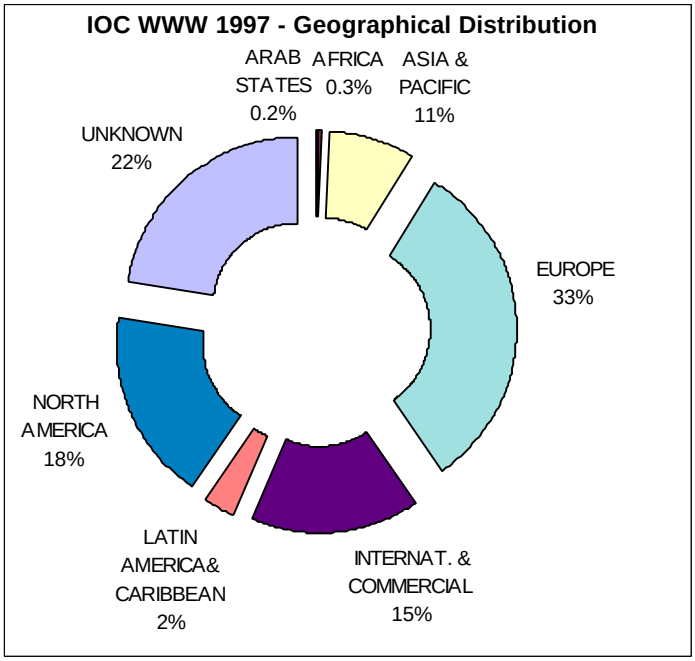


Figure 2

The majority of visits originate in Europe and North America followed by the Asia and Pacific region (Figure 2). Substantial efforts will need to be undertaken to increase visits from Latin America & the Caribbean, Africa and Arab States. Their low number of visits may be due to a language problem: the IOC WWW server is currently available in English and Russian only. French and Spanish translations are presently considered, through additional resources made available to the IOC Secretariat.

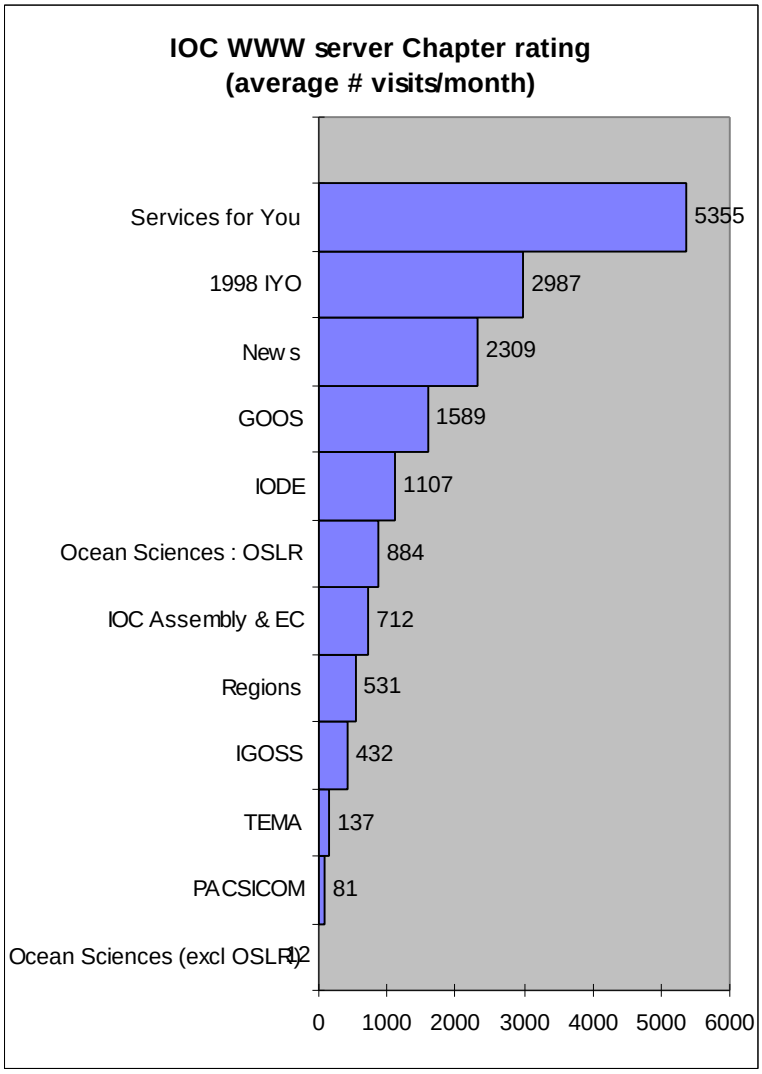


Figure 3

In terms of the rating of the various chapters Figure 3 clearly shows that the Services (Ocean Pilot. GLODIR, IDALIC, IOC List of Acronyms, Oceans Listserv catalog, International Marine Meeting List, IOC Electronic Library, Software) receive the majority of the visits, followed by the 1998 International Year of the Ocean server, and the news service (IMS Newsletter on-line, Newsletters HAN & WINDOW). We note that the 1998 IYO server has seen a fast growth: from 1838visits/month in June 1997 to 5436 in December 1997.

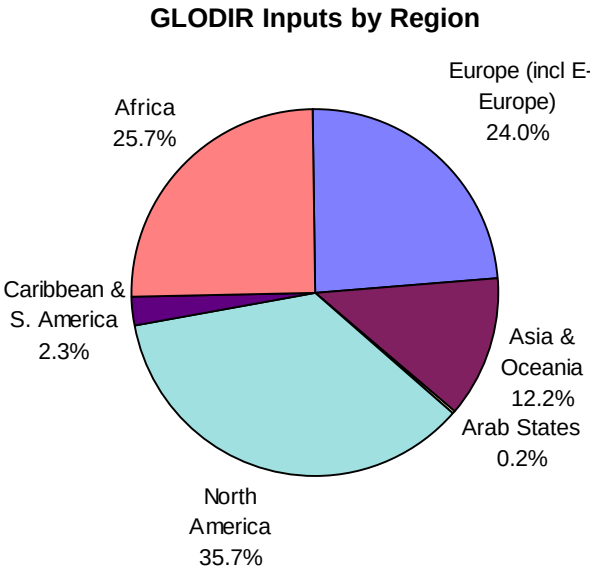
A poll carried out in September 1997 revealed that the technical performance of the UNESCO-IOC webserver (Internet access) needs to be improved as most users consider the performance average. It is planned to resolve this matter in 1998.

Main achievements in 1997:

GLODIR

14 February 1997: Launching of the **Global Directory of Marine (and Freshwater) Scientists GLODIR.** The Global Directory of Marine (and Freshwater) Scientists is a database containing information on scientists and their

scientific interests from all regions (Figure 4). The GLODIR is a product developed under the auspices of the IODE's Group of Experts on Marine Information Management (GE-MIM). An on-line input system of the Global Directory of Marine (and Freshwater)Scientists (GLODIR) has been developed. The system allows for individual scientists to submit (and in future update) information on their scientific activities so as to enable the marine science community as well as policy makers and others interested in marine related issues to easily identify experts in subjects of their interest. The system uses the ASFA subject codes for standardized description of activities. The database can be searched on-line by name of the scientists, organization, country, Uniform Resource Locator (URL), ASFA categories, free text and environment.



GLODIR is maintained by the IOC Secretariat, and developed within the 'free flow of scientific data and information' philosophy of the IODE. Therefore consultation of the database is free for all. Input is collected on-line, as well as through collaborative agreements with IOC regional Secretariats (IOCARIBE, WESTPAC, HAB), regional programmes/projects (RECOSCIX-WIO,...), and special interest organizations (IAMSLIC, EURASLIC,...). Although the main target audience of the Global Directory is the Marine Science community, freshwater and brackish water scientists are not excluded. By the end of October 1997 the database contained information on over **3000 scientists in 100 countries**. In order to enable on-line editing of entries by the individual scientists it is planned to install a new server in 1998. Projects are being drafted to obtain detailed coverage of specific regions.

Figure 4

URL: **http://www.unesco.org/ioc/infserv/glodir.htm**

IODE Homepage

1 March 1997: opening of the IODE Homepage. The new server is aimed at anyone interested in ocean data and information and wishes to highlight and strengthen the links between IODE Data Centres and their users throughout the world. It emphasises the wealth of activities and products developed by the IODE community including its over 50 NODCs, DNAs, RNODCs and WDCs. The server provides detailed information on the IODE system, its components, products and services. Links are included (where available) to NODCs, RNODCs and WDCs.
URL: **http://www.unesco.org/ioc/oceserv/iode/iodehome.htm**

IYO Homepage

2 June 1997: opening of the 1998 International Year of the Ocean Homepage. The main objective of the 1998 IYO server is to provide up-to-date information on all activities undertaken by the IOC as well as by individual Member States during 1998. The server includes chapters on background, objectives, who-does-what, activities (ocean charter, ocean education, stamps, public information, national contributions, ocean wards, conferences/workshops/courses, research & training cruises, publications, other initiatives), and includes links to the EXPO98 and Ocean98 servers.
URL: **http://www.unesco.org/ioc/iyo/iyohome.htm**

IOC Electronic Library

1 October 1997: opening of the IOC Electronic Library. Since its establishment in 1960 the IOC has organized hundreds of Conferences, Workshops and Training Courses. Most of these activities were documented and reported in IOC Publications. Many of the IOC Programmes and world renowned experts collaborating with the IOC have also produced Technical Manuals and Guides and a wealth of other reference documents. Traditionally

these were sent to participants in these events and to IOC Depository Centres only. The IOC Electronic Library provides free and unrestricted access to all these documents and in full-text. A first batch of 100 documents (mainly Workshop Reports) were loaded on the server on 1 October. These were the result of a two-month document conversion (paper to electronic version) project which also provided essential information on the efforts which will be required to convert more ›historical‹ material. The electronic library provides access to the documents in html (for immediate on-screen access) and Acrobat PDF format (for downloading and personal printing). It is also planned to make the electronic collection searchable. This service will hopefully become available early 1998.
URL: **http://www.unesco.org/ioc/infserv/elib.htm**

2.2.5 MEDI

As a follow-up to IODE-XIV (1992) a MEDI Pilot Project was undertaken by the Australian Oceanographic Data Centre (AODC). A comprehensive mapping exercise was undertaken to compare the Australis=s ›Blue Pages, UK=s EDMED and USA=s FGDC meta data standards. In 1998 experts from different data centres will meet to discuss arrangements to facilitate exchange of meta-data.

2.2.6 National Oceanographic Programmes (NOPs)

In 1997 a total of 17 NOPs were received by the IOC Secretariat. They were distributed to the Member States and were also sent to the University of Delaware for inclusion in the OCEANIC service.

2.3 INTERNATIONAL TSUNAMI WARNING SYSTEM (ITSU) AND OTHER IDNDR-RELATED ACTIVITIES

In 1997, the implementation of the IDNDR-related activities, Tsunami Programme and the Storm Surges project development occupied a considerable place in the overall IOC activities. 1997 started with the ITSU Officers meeting in Honolulu, Hawaii, 29-31 January 1997. The meeting summarized the progress achieved by the ICG/ITSU during the intersessional period and discussed the preparation for ITSU-XVI. The Sixteenth Session of the ICG/ITSU was successfully held in Lima, Peru, 23-26 September 1997, with the participation of representatives of 11 Member States of the Pacific. The Summary Report is available. Among the main achievements of the International Co-ordination Group it is worth mentioning the completion of the first phase of the joint IUGG/IOC TIME project and publication of the IOC Manual and Guides No. 35, a manual on Numerical Method of Tsunami Simulation with the Leap-Frog Scheme, 1997, UNESCO; development of the second version of the ETDB datasets and supporting software (Figure 2.3.1); further modernization of the tsunami warning system by wide installation of TREMORS, improvements in communication technologies and development and deployment of ocean bottom pressure senors (OBPS) for tsunami detection in the open sea. Member States in more and more geographical areas are becoming concerned with the potential danger of the tsunami disaster and looking for advice from, and co-operation with the ICG/ITSU. Tsunami programmes in Europe and IOCARIBE have been considered in detail. The Workshops on Tsunami have been arranged in Chile and IOCARIBE attended by experts from Central and South America.

To increase preparedness for and awareness of its tsunami danger, ICG/ITSU has developed a plan of action which includes publication of guiding materials (a field guide for Post-Tsunami Surveys has been finalized and will be published in the beginning of 1998). This Guide contains guidelines to establish tsunami field survey teams, procedures to conduct the field investigations, and identified required field survey equipment), promotional materials (translation into Spanish of the children=s cartoon book ATsunami Warning@ and modification of the ATsunami Great Waves@booklet), information papers (two issues of the ITIC Tsunami Newsletter were published in 1997) and educational material (textbooks and guidebook for teachers on Earthquakes and Tsunamis have been published by UNESCO in English and translation of books into Russian languages has been completed).

The ICG/ITSU has contributed to the development of the education poster on Ocean and Coastal Hazards published by the USA in English. Translation and publication of the poster in other languages is under consideration of the ICG/ITSU Member States.

On the whole, we may say that the programme has been successfully developed in 1997 primarily due to the national contribution and through the co-operation with international organizations, such as IUGG, EU and ICSU/WDCs.

Storm Surges

In response to the decision of the IOC Executive Council taken at its Twenty-Ninth Session (Paris, September 1996), the development of the draft project on Storm Surges has been completed and a joint meeting of experts from IOC, WMO and UNESCO/IHP will be held in New Delhi, India from 3-6 February 1998. A final version of the project proposal will be given to the next session of the IOC Executive Council for consideration and approval.

›**Meeting of the Working Group= of the Inter-Agency Steering Committee for IDNDR, Geneva, 18**

November 1997 of El Niño

The meeting was attended by UN agency representatives most of whom provided short statements and printed materials. Both IOC and UNESCO tabled submissions and later collaborated in production of a press-release dealing with the problem. The main submission to the meeting was the DR supported by the Group of 77 and China entitled ›International cooperation to reduce the impact of the El Niño phenomenon=. The preamble of this DR (Agenda Item 98 Id) of the Fifty-second session of the Second Committee), part of which reads as follows: ›Acknowledging with concern the possible effects that El Niño may have on global weather patterns, such as abnormal droughts and precipitation around the world, leading to a shortage in world food supplies and famine in several regions that could extend over a number of years=. This resolution (A/C.2/52/L.37) was subsequently passed by the UN General Assembly (Second Committee) under the heading of ›Environment and Sustainable Development - International Decade for Natural Disaster Reduction=. The resolution particularly calls on IOC of UNESCO together with UNESCO itself, among other UN Agencies, to contribute to a comprehensive approach and study of El Niño and to intensify cooperation with the regions affected particularly developing countries.

2.4 REMOTE SENSING ACTIVITIES (other than GOSSP))

2.4.1 Committee on Earth Observation Satellites (CEOS)

To assist in taking forward the remote sensing requirements of the IOC, it has become an Affiliate Member of CEOS. This has meant participation in various CEOS Working Groups, and in the development of the Integrated Global Observation Strategy (IGOS) which has been promoted by CEOS. The business of CEOS and progress with IGOS were reviewed at its plenary meeting in November 1997.

2.4.1.1 Integrated Global Observation Strategy (IGOS)

The rationale for the IGOS is to provide an overall framework in which users can present their requirements and providers can address their commitments. A more effective use of Earth observation assets requires closer coordination of observing and analysis programmes. Data providers need a strategy to avoid redundancy, to fill data gaps, to integrate data from various sources and to coordinate operational and research systems.

IGOS will be dependent on international coordination among participating agencies, based on a mutually agreed framework for definition, planning and conduct of observations. There is a need for a commitment to full and open data exchange. IGOS has to integrate three different global observing systems as part of its strategy: (1) the operational observing systems, e.g, the World Weather Watch (WWW), (2) systems for coordinated Earth observations (eg the G3OS), and (3) research observing systems. To be successful IGOS requires an integrated framework for space-based and in-situ observations, and voluntary participation from countries and agencies. Within this framework, requirements from multiple user communities have to be integrated and prioritised. One of the major challenges for an IGOS will be the achievement of a balance between research and operations, as well as between space and in-situ measurements.

The IGOS **Strategic Implementation Team (SIT)** was formed to define, characterize and develop a vision for IGOS; define responsibilities of the space component of IGOS; address, with relevant partners, the interface between the space component and the in-situ component, in the context of user requirements, with appropriate mechanisms for seamless integration; and dialogue with the Analysis Group (see below), so that mutual guidance can be achieved, including taking responsibility for defining the output of the Analysis Group. The SIT agreed at its first meeting in Irvine, California, February 1997, on six key issues, as the basis for developing project statements for prototype activities. The Irvine report includes a table listing the proposed initial IGOS implementation projects. Listed below are the two ocean related projects:

Global Ocean Data Assimilation Experiment

To produce global analyses/forecasts/hindcasts based on limited models and data streams there is a need for an integrated suite of remote (and direct) measurements of the ocean for real-time assimilation, interpretation and application. The project will provide a regular, global depiction of the ocean circulation, from climate down to ocean eddy scales, consistent with the measurements and appropriate physical constraints. It will rely on a real-time satellite data stream; a global in situ observing system; assimilation to exploit the integrated data stream; models and computers for production and output of products; and high band-width communications. Here the OOPC forms the natural partner for the space agencies.

Long-Term Ocean Biology Measurements

To understand and then predict regional influences and variations in the ocean environment there is a need to make effective use of the several satellite-borne ocean colour sensors that are in operation and planned. A coordinated strategy is required to meet the data needs for scientific studies of ocean biogeochemical and ecosystem processes. It will involve a coordinated calibration/validation campaign integrating satellite and in situ observations. Since 1995, the International Ocean Colour Coordination Group has provided the required mechanism to address these needs, and the group has accomplished its specified tasks during 1996 and 1997. Following the establishment of the Living Marine Resources panel of GOOS, the continued activity of IOC in this area will be coordinated through that panel.

The **CEOS Analysis Group (AG)** was established to work closely with the SIT in taking forward the concept of the IGOS. The principal aim of the AG is to provide the CEOS Plenary and the SIT with analysis of the extent to which the existing and planned space segment missions are meeting the identified international and national user requirements, as encapsulated in the CEOS and Affiliates databases.

2.4.1.2 CEOS Working Group on Information Systems and Services (WGISS)

The CEOS Working Group on Information Systems and Services (WGISS) held its fourth meeting in May 14-16, 1997 at the Canada Centre for Remote Sensing in Ottawa. It was immediately preceded by the first meeting of the WGISS Strategy Task Team on May 12-13. The three WGISS Subgroups - Access, Data, and Networks - met in Toulouse, France (hosted by CNES) in April 1997, along with a number of WGISS Task Teams.

Building on discussions begun at the WGISS Strategy Task Team meeting, WGISS prepared a proposal regarding the Integrated Global Observing Strategy (IGOS) initiative. WGISS offers to support the IGOS pilot projects through tools, techniques, and recommended practices for data identification, locating data needed for the projects; data delivery, using and establishing advanced network capabilities; and data preparation, including formatting and geometric transformation, to support inter-use of data. For each of the six IGOS projects, a WGISS point of contact has been identified and examples offered for how WGISS can contribute to the project.

The Strategy Task Team (STT) agreed to focus on evaluating the consequences of the technical work done by the subgroups/task teams and developing strategic recommendations to direct WGISS toward accomplishing its long-term goals. The STT encouraged Subgroups and Task Teams to engage in pro-active encouragement of adoption of their results by data users and providers. Increased outreach to the user community is urged, by involving users in prototype and demonstration projects. The IGOS projects are seen as a significant opportunity for outreach to the user community.

2.4.2 International Ocean Colour Coordination Group (IOCCG)

The IOCCG was set up to assist in coordinating the interests of the scientific community and space agencies in making ocean colour measurements work effectively for the benefit of (mainly) the ocean biology community. The work of the IOCCG was governed by direction given it by the IOC Assembly, with support from contracts which specified the activities that were to be accomplished, and matching support, in kind and in cash from the IOC.

Overall the IOCCG has accomplished all its major goals as described in the contract documents, having:

(i) provided widespread promotion through publication in the CEOS Newsletter and backscatter Magazine; reports to CEOS, J-GOOS, COSPAR and the IOC Assembly and Executive Council; and development of a Homepage as part of the IOC Homepage and as part of the EU/JRC Homepage.

(ii) convened two sessions of the IOCCG and of its Executive, as well as a Workshop on Calibration and validation. During the year there has been one meeting of the IOCCG,and one meeting of the IOCCG Executive, both in Tokyo.

(iii) visited or contacted a number of countries in S.E.Asia to assess the interest of the ocean community in ocean colour products and the availability of relevant in situ data bases (including a presentation on ocean colour in the Gulf of Thailand Workshop).

(iv) held discussions with countries in the WESTPAC region and South America regarding the development of training workshops on ocean colour, and prepared to include ocean colour in the GOOS capacity building workshop in Fiji in 1998. Preparations were made for ocean colour training activity envisaged for early 1998.

Because the IOCCG has discharged its requirements, and because GOOS will take over responsibility for ocean colour (through (i) the newly created Living Marine Resources Panel; (ii) GOSSP for coordination of requirements for ocean colour; J-DIMP for management of ocean colour data; and GODAE for assimilating ocean colour data), the IOCCG was terminated at the end of 1997 as an IOC-sponsored body.

The IOC will in future direct its limited resources into the two activities, GOOS LMR and GODAE, that are most directly beneficial to both the ocean colour observation effort and the needs of its member states. The work of the IOCCG was very beneficial during its period of activity in promoting ocean colour through the implementation of the agreed pilot project. Now appears to be the time to move the operational, capacity building and intergovernmental activities as regards ocean colour observations to groups within the context of other on-going priority activities. IOC will continue to work closely with CEOS as it has in the past to ensure that ocean colour observations and other ocean remote sensing activities are closely co-ordinated.

2.4.3 Regional Remote Sensing Activities

At the request of and with support from Japan, IOC conducted member state visits to Philippines, Indonesia, Malaysia, Singapore, Bangkok and Tokyo during the period 14-29 January 1997 to formulate an APEC initiative for the development of remotely sensed products, in particular those related to ocean colour, and the expansion of the data and information management systems within the Asian region to distribute these products. The results of this mission were incorporated into documents in Tokyo for presentation at the APEC Seminar on AEarth Observation for Users@ (Tokyo, 3-5 March 1997). IOC was invited to participate in the Seminar to present the results of its survey and participate in discussions on future development of an APEC initiative in this area.

3. GLOBAL OCEAN OBSERVING SYSTEM (GOOS) AND RELATED MATTERS

3.1 GOOS DESIGN AND PLANNING

Considerable progress is being made in GOOS. As the culmination of phase 1 (planning) a set of Principles has been devised, and a Strategic Plan has been written and will be printed early in 1998. Work is now taking place on a guide to implementation which will be published in May 1998.

We are now moving into phases 2 and 3 (implementation). Phase 2 (implementation of pilot/demonstrator projects) began in late 1996 with the establishment of the NEAR-GOOS Pilot Project in the northeast Asian region. NEAR-GOOS continued developing through 1997. In Europe the EuroGOOS Association of 22 operational agencies in 14 countries continued the development of European operational oceanography in support of GOOS, focussing on the design of pilot projects in the Arctic, Baltic, Mediterranean, NW European shelf, and Atlantic. In the Indian Ocean the nations of the western Indian Ocean agreed to form the Western Indian Ocean Marine Applications project (WIOMAP), a GOOS Pilot Project.

Phase 3 (making use of existing systems) has also begun. In the USA, NOAA formed a GOOS Centre in the Atlantic Oceanographic and Meteorological Laboratory, to maintain oversight, development and use of its network of drifting buoys and Ships of Opportunity (SOOP). NOAA also agreed that the Tropical Atmosphere Ocean (TAO) array of buoys in the Pacific formed a contribution to GOOS. Similarly, the SOOP Implementation Panel decided that the SOOP network formed a contribution to GOOS.

In addition, several nations continued the development of GOOS within their own countries, forming national GOOS committees and considering which parts of their present systems might form contributions to GOOS.

GOOS is no longer a figment of peoples= imagination. It now has several concrete elements, in addition to those mentioned the Global Coral Reef Monitoring Network, and more are due to come on stream before too long. In order to take things forward we plan several activities for 1998. Firstly there will be a meeting in Sydney in March, of GOOS and GCOS with the key people in the existing operational systems like IODE, IGOSS, GLOSS, DBCP, SOOP, and CMM, to agree on what actions need to be taken to make the most of the present international systems in implementing GOOS. Secondly there will be a First GOOS Agreements Meeting in the summer of 1998, at which (a) Government representatives will be asked to >sign up= to the Principles of GOOS, and (b) Heads of operational agencies will be asked to make specific parts of their national operational systems contributions to GOOS. Both of these meetings will help to add further elements to GOOS, building a comprehensive initial GOOS by the end of the year. Once this is in place, it will be possible to address how we might go about filling the gaps in the system.

Progress is being assisted by certain organisational changes. IOC has made available a permanent UNESCO post for the Director of the GOOS Project Office (GPO), and that post has now been filled. Following consultations between the co-sponsors, and formal endorsement by I-GOOS and by the IOC Assembly (June 1997), the GOOS organisation is being further changed by the merger of J-GOOS and the Strategy Subcommittee for I-GOOS, to form a new GOOS Steering Committee (GSC), at the end of 1997. The GSC will be chaired by Dr.Worth Nowlin of Texas A & M University, former chairman of the Ocean Observing System development Panel (OOSDP). Additional assistance for the GPO has been provided in the form of a secondment by Brazil of Ms Janice Trotte from mid 1997.

On a broader front, the sponsors of the global observing systems (IOC, WMO, UNEP, ICSU, FAO and UNESCO) have taken steps to begin development of an integrated strategy for global observing that will provide a common base of operation for all three observing systems GOOS, GTOS and GCOS. In future, each will be presented as one of a set of observing systems. In addition, discussions have begun between the sponsors and CEOS (Committee on Earth Observation Satellites) regarding the development of an Integrated Global Observing Strategy embracing the sponsoring agencies and the satellite agencies.

To give GOOS greater visibility, the GOOS Newsletter has been revived; a third and fourth issue were published during the year. To further raise awareness, it is important that the GOOS Project Office has a comprehensive list of those interested in GOOS, including national GOOS contacts with whom the GOOS Project office can interact. We need the assistance of GOOS representatives in each Member States to develop this network for us so that the distribution of GOOS information can be improved.

3.1.1 The Joint Scientific and Technical Committee for GOOS (J-GOOS)

The Joint Scientific and Technical Committee for GOOS (J-GOOS) at its fourth session (Miami, April 1997) reviewed the broad spectrum of planning efforts underway and set in motion actions to move the Health of the Ocean (HOTO) and Ocean Observing Panel for Climate (OOPC) modules into an implementation phase. The green light was given for OOPC to move ahead with the Global Ocean Data Assimilation Experiment (GODAE) proposal, and to HOTO to proceed with despatch to implement pilot projects as it broadens its scope to include human health and societal issues. Decisions were implemented to accelerate planning for the Living Marine Resources (LMR) and Coastal modules. A coastal module workshop in Miami in February 1997 provided guidelines for J-GOOS for the development of this module and stressed that priority be given to stimulating the organization of regional entities (e.g., EuroGOOS, NEARGOOS) that could define their own local requirements for observations. The workshop also identified a set of Acore@ observations that could be considered common requirements for most regional programs. The chairman for the Coastal Module (Dr.Tom Malone) and the co-chairs for the LMR Module (Dr. Warren Wooster and Dr. Patricio Bernal) were appointed. The first panel meetings of both groups are likely to be early in 1998.

Agreement was also reached with GCOS and GTOS to address planning for data and information management and for space observations for all three observing systems via two joint Panels, the Joint Data and Information Management Panel (J-DIMP), which met in Tokyo in July 1997, and the Global Observing System Space Panel (GOSSP), which met in Paris in May 1997.

Other building blocks were put in place to solidify the foundation of GOOS. In order to prepare a comprehensive underpinning document for GOOS, identifying it as a safe, solid, financially sound investment, a group of experts was formed to oversee the drafting of this document, to be called The GOOS 1998. The GOOS 1998 will serve in the way a prospectus serves for a new company seeking financial support, and will be a companion document to the Strategic Plan. This document and the Strategic Plan will be the principle background documents for the First GOOS Agreements meeting in 1998.

3.1.1.1 The Ocean Observations Panel for Climate (OOPC)

The OOPC is jointly sponsored by GCOS, GOOS and the WCRP with stewardship for the Panel provided by the IOC. This was a very busy, very active year for Panel members: producing special papers, proposing new projects and participating in meetings of other Panels, (e.g., GLOSS, SOOP, DBCP, CLIVAR, JGOFS, TAO, Joint GCOS-GOOS Space Observations and Data Management Panels). It was at its second session, 11-13 February 1997 in Cape Town, South Africa, where the Panel laid out a busy 1997 agenda for inter-sessional work by the members. A number of achievements can be cited.

An implementation structure was designed and put in place for operational and research SOOP XBT programs. The OOPC, together with the CLIVAR Upper Ocean Panel are responsible for providing timely scientific advice on the design and implementation of the program.

With regard to sea level observations, the Panel engaged in a workshop with the GLOSS group of experts to produce an implementation plan and undertook a study to look at the merging of in situ and satellite altimeter data

for the problem of long-term climate change. It is hoped that as a result of this study and those of a review by NOAA (in which the OOPC also participated) a subset of quality sites will be chosen that will meet the expected needs of the ocean observing system for climate.

The OOPC also played a consultative role: 1) with the Joint GCOS-GOOS Data and Information Management Panel (DIMP) in advising on initiatives proposed to demonstrate the quality and worth of GCOS/GOOS products; 2). with the Data Buoy Cooperation Panel (DBCP) in providing scientific advice regarding surface drifter deployments; and 3) in contributing to the preparation, of a report titled AThe Global Ocean Observing System: The Role of *In Situ* Observations@.

Beyond its cooperative/consultative role, the OOPC generated on its own two significant new initiatives. The first was a timely workshop on Ocean Time-Series Observations that enjoyed strong support from its three cosponsors plus JGOFS. The workshop, which took place in Baltimore, USA, in March 1997, concluded that there is a continuing, and in fact expanding need for time series data in order to study the role of the ocean in the earth=s climate system. To date, every such time series has produced new scientific information that continues to remind us how little we really know about many aspects of the ocean. Often, the data have upset traditional assumptions about its variability and forced the development of new ideas and hypotheses to explain the contradictions the data pose. From what was learned from other reports and from the scientific contributions and operating problems associated with existing and recently terminated time series stations, the workshop developed a set of desired attributes and recommendations for ocean time series stations to be considered for the future ocean climate observing system.

The second initiative was a proposal to mount a Global Ocean Data Assimilation Experiment (GODAE). The idea behind GODAE is to target a particular period (nominally 2003-2005) for a large scale demonstration of the power and utility of an integrated satellite, *in situ* observing system coupled to state-of-the-art, eddy-resolving models and assimilation techniques. For those familiar with meteorology, it is analogous to their FGGE. The prime motivation is the need to provide convincing evidence that remote and direct measurement systems should be supported for the long-term. If it is successful in engendering the required support, its scope will quickly expand beyond the mission of the OOPC. The initial circulation of the project description among scientists and various related programs and organisations to test the feasibility of such a proposition resulted in enthusiastic positive feedback for mounting such an initiative. The Committee on Earth Observing Satellites (CEOS) gave its endorsement by adopting GODAE as a Pilot Project. The huge scope and envisioned schedule of the experiment required that the planning be put on a separate fast track apart from other OOPC activities. There will be a meeting in Melbourne 20-22 Jan 1998 to take things forward. GODAE is likely to operate semi-independently of OOPC.

3.1.1.2 The Health of the Ocean (HOTO)

The main activity during the year was the convening of the Fourth Session of the HOTO Panel at the National University of Singapore, 13 - 17 October 1997. The agenda dealt with updating the HOTO Strategic Plan, indicators for measuring progress in creating sustainable development, modelling, HOTO deliverables, user needs, and blueprints for the implementation of several regional pilot projects. There were major discussions on human health issues, including: (i) the comparative infection rates for cholera and other diseases and the physiology of Vibrio cholerae, (ii) the risks to public health imposed by algal blooms and any association with human disease transmission, (iii) endocrine disruptors, and (iv) ballast water.

Human Health Issues:

Cholera: Following the publication of the HOTO Strategic Plan in May 1996, a debate arose within the HOTO Panel concerning the relationship between global warming, the occurrence of marine algal blooms and outbreaks of cholera. Long term survival of Vibrio cholerae in water has been shown in laboratory microcosms at a wide range of salinities ranging from 1 to 30 psu, representing the spectrum from freshwater through estuaries to coastal seawater. Also, survival in fresh waters occurs in association with a variety of freshwater algae. V. cholerae can attach to seaweeds in laboratory mesocosms. However, although it is accepted that V. cholerae is a member of the autochthonous microbiota of estuarine and natural bodies of inland water, there is no evidence that V. cholerae fills a similar ecological niche in the open sea or coastal waters. In a HOTO monitoring program, detection of the very low concentrations of V. cholerae in seawater will require major technological developments. The best indicator of the occurrence of significant numbers of V. cholerae in the marine environment is the appearance of cholera cases. At this stage the HOTO Panel believes that V. cholerae should not be added to the list of analytes in the program.

The Panel concluded that the matter of increasing cholera incidence as a result of climate change is speculative and a proper evaluation requires further research. A causal association between global climate change, algal bloom frequency and risks to human health has not yet been established, nor has evidence that the frequency of marine algal blooms is increasing (see below). The claim that cholera incidence would increase as a consequence

of climate change and may be related to an increase in algal blooms appears to be unsupportable. Cholera epidemics occur largely as a result of poor sanitation, especially in tropical developing countries. While contamination of food or water might result from cholera introductions from the marine environment, the assertion in the HOTO Strategic Plan that there is little justification for prioritizing this area is upheld.

Algal blooms: The question of whether or not the frequency of occurrence of harmful algal blooms has increased is not answerable without an adequate long-term monitoring program. As the basis for such monitoring, the Panel proposed that measures of phytoplankton standing crop variability and community structure be added to the list of specified HOTO measurements. It was also agreed that the distinct issues of:

1. global change in the frequency and diversity of harmful algal blooms; and
2. the more local user demand for early warning of harmful algal blooms that might safeguard marine resource extraction use;

should be approached independently, at least initially. There is a need for greater cooperation between HOTO and the Intergovernmental Panel on Harmful Algal Blooms (IPHAB).

Endocrine disruptors: Since the publication of the HOTO Strategic Plan, new concerns have emerged with regard to endocrine disrupting chemicals. Anthropogenic chemicals released to the environment can disrupt the endocrine systems of a wide range of organisms . The reproductive hormone-receptor systems appear to be especially vulnerable, with changes in sperm counts, genital tract malformations, infertility, an increased frequency of mammary, prostate and testicular tumors, feminization of male individuals of diverse vertebrate species and altered reproductive behaviour.

With regard to environmental management, the problem of endocrine disrupting chemicals is extremely difficult to address. This is because it is not clear:

i) to what extent endocrine disruption is occurring in aquatic and terrestrial biota;
ii) whether endocrine disruption is sufficiently severe to cause changes in ecosystem structure and function;
iii) which of a multitude of chemicals are the most important with regard to endocrine disruption and whether endocrine disruption is caused by the cumulative effects of many chemicals;
iv) what the influence of endocrine disruptors is on invertebrates (the major animal components of all ecosystems);
v) whether endocrine disruption can be detected at a sufficiently early stage to permit remedial action to be instigated. Early detection of endocrine disruption in organisms in situ or in laboratory test systems is not currently feasible;
vi) which life stages of organisms are most vulnerable to endocrine disrupting chemicals; and
vii) whether endocrine disruptors give rise to any trans-generational effects.

Further research is required to identify the causal relationships that could be used to define the nature and need for monitoring measurements. At this stage, the matter should be periodically reviewed to assess progress. In the meantime, a simple strategy of recording the frequency of feminization of male fish in estuarine and coastal areas might help to provide some insight into the extent of the problem on a global scale. If funding permits, this effort might be supplemented by use of the vitellogenin biomarker approach which signals exposure to xeneostrogens in fish.

Ballast Water: The Panel discussed the progress of the work of the IOC-IMO-ICES Study Group on Ballast Water and Sediments, noting that the next meeting is scheduled for March 30-31, 1998, in the Hague. The HOTO Panel is concerned with ballast water issues from the perspective of human health risks and the interests of IMO in minimizing environmental hazards associated with ballast water transport. Introduction of alien species by ballast water is of primary interest to the LMR Panel.

Modelling: An overview of models available for HOTO applications was presented to the Panel at its meeting in Singapore. Data interpolation issues were addressed in relation to the knowledge of processes that enables the models to be constructed in response to prevailing scientific understanding of the processes controlling the observations being made. Models need to be considered from two aspects: their usefulness for interpolation to reduce the diversity and frequency of observations; and their use to convert observations into products of direct value to users. The former are likely to have value in the implementation of HOTO Pilot Projects, while the latter will mostly be used for operational purposes according to the nature of user requirements.

Modelling appropriate for HOTO should complement that being carried out or planned within the framework of other GOOS Modules. Since a primary objective of HOTO is to study marine responses to anthropogenic inputs, modelling in HOTO will be focussed primarily on marine contamination and pollution-related issues in the coastal

zone and inner shelf with relatively less emphasis on the open ocean. This provides a strong link to the Coastal Module of GOOS.

HOTO modelling should help to develop forecasting skills, and is an essential tool for optimum utilization and management of resources. An early warning system for eutrophication, for example, would be useful since eutrophication may lead to increased algal blooms, anoxia, massive fish deaths and major alterations in biological communities. Such a system would rely on sophisticated physical-biochemical-ecosystem models that incorporate living and non-living components of the system. Simpler models can be used to predict the dispersion of passive tracers such as oil spills, and accidental releases of contaminants, radioactive tracers and sediment load. These models should be coupled with dynamic models of regional circulation. Water quality modelling can assist in the development and possibly predict the effectiveness of measures to prevent pollution and contamination in the water column. When integrated with risk analysis models, all these models might contribute to assessment of sustainable development of the ecosystem and characterization of human use/activity and other socio-economic parameters.

Predictive modelling should be supported by process-oriented modelling to understand the effects of physical and biogeochemical processes on the functioning of the ecosystem in general. Considering the fact that ecosystem models are generally of limited predictive capability due to our poor knowledge of the representations and parameterizations of many biogeochemical processes, knowledge gained by process modelling will be essential to upgrading the operational forecasting capabilities of the system.

In addition to event-specific forecasting/prediction models, HOTO is interested in implementing models that may help modify the observation strategy. Models can be used to enhance information derived from the observation network by feeding back information into the observing system, either to assist in its design or to control its operation. Furthermore, an observing system may not provide all the data necessary to initialize and force the models. Under such circumstances data assimilation methods are powerful tools which make it possible to estimate some of the model parameters from a limited number of observations under certain constraints and, therefore, complement data obtained by the HOTO observing system.

Numerical forecasting inherently suffers from the intrinsic instability of equations describing the ocean. A numerical model, even when initialized with a realistic oceanic state characterized by the parameters of the observing system, loses the memory of its initial state after a finite time - the predictability time - and diverges exponentially from the observational state. Data assimilation allows periodic updating of the models with new data which constrain the model evolution so that it closely follows the oceanic observational state. The ocean color data from SeaWIFS, and other satellites, for example, as well as time series of data from coastal stations, are particularly useful for this purpose. While the monthly and longer-term prediction of complex biogeochemical processes is presently an area of active research rather than straightforward operational tools, forecasting at weekly time scales should be realistic within the framework of HOTO objectives.

The Fourth Session of the HOTO Panel in Singapore, 1997, identified a substantial amount of inter-sessional work, and agreed that the next session should be convened within eighteen months.

Other activities related to HOTO development included:

(i) attendance at a number of planning meetings and workshops, to provide information on the HOTO Strategic Plan, to develop pilot projects, and to inject HOTO components into regional activities addressing environmental quality and coastal management issues;

(ii) a fact-finding mission to the WESTPAC Region to discuss pilot projects;

(iii) discussions at a GIPME Officers' Meeting at IMO, London in May, 1997, on human health issues related to ballast water, and on sediment quality and mussel watch activities;

(iv) consideration at an IOC/UNEP/IMO GIPME Workshop on Sediment Quality Guidelines (London, 6 - 9 May, 1997) of scientific approaches to establishing sediment quality guidelines that might be suitable for a range of management applications such as the London Convention 1972, the Global Programme of Action for the Protection of the Marine Environment from Land-Based activities;

(v) a report by the Chairman of the HOTO Panel to the XIXth IOC Assembly

3.1.1.3 The TAO (Tropical Atmosphere-Ocean) Implementation Panel

Through its support for TOGA, IOC was intimately involved in the development of the TOGA-TAO array of buoys for observing and monitoring El Niño in the tropical Pacific. Since the TOGA programme finished in 1994, the

community has been moving to >operationalize= this array, and it seems likely that this will be achieved shortly with resources from NOAA.

The development of observations in the tropical oceans has been the responsibility of the TAO-Implementation Panel (TIP), sponsorship of which has been shared by GOOS and GCOS. The Sixth Session of the TAO Implementation Panel (TIP-6) was held in Reading, UK, from 4-6 November 1997, and hosted by the European Centre for Medium Range Weather Forecasting (ECMWF). The purpose of the meeting was to review the present status of the TAO array; to address technical and logistic issues related to maintenance and expansion of the array, and to provide a forum for discussions on the use of data being generated by the array, both on scientific and operational grounds. The scientific presentations highlighted the very special contribution TAO data has being making to models predicting El-Niño events in the Pacific, and the societal implications for those countries influenced by this global phenomenon.

In due course it is hoped to expand the tropical atmosphere-ocean observing array to include the topical Atlantic and Indian Oceans. The major new development is PIRATA, in the Atlantic (see below). Because of these developments the TIP recognised that its Terms of reference have to be kept under review to take into consideration new observational programs that would greatly benefit from its activities.

The Seventh Meeting of the TAO Implementation Plan is planned to take place in Abidjan, Ivory Coast, in November 1998, in conjunction with a PIRATA meeting planned for the African region. The TIP meeting will for the first time be extended to reach African country interests in the data being provided by the TAO array.

3.1.1.4 The Pilot-Research Moored Array in the Tropical Atlantic - PIRATA

PIRATA is an important internationally funded pilot-project which for the first time will provide the comprehensive basis for detecting ENSO events in the Atlantic, to enable improvements in forecasts of climatic conditions especially for South American and African countries impacted by tropical Atlantic events. For this reason its establishment is strongly supported by the IOC, which sent a representative to the Fourth Meeting of PIRATA, at the Directorate of Hydrography and Navigation, Rio de Janeiro, Brazil, from 20-22 November 1997. At this meeting scientific contributions were presented on the gathering and assimilation of data into models for the tropical Atlantic.

The next PIRATA Meeting will be held in Abidjan, Ivory Coast, in November 1998, which will help to show African nations that IOC is supporting an initiative of considerable interest to them. Thus far the African states interested in PIRATA include notably Ivory Coast, Senegal, Mauritania, South Africa and Nigeria. The participation of those countries in PIRATA, and in GOOS as a next step, will greatly increase the effectiveness of data gathering on an operational basis in the tropical Atlantic.

3.1.2 The IOC-WMO-UNEP Committee for GOOS (I-GOOS)

The biannual I-GOOS meeting was held in Paris on June 25-27, 1997. The first day was devoted to the First GOOS Forum, at which progress in the planning and implementation of GOOS was reviewed for the benefit of member states and representatives of selected operational agencies. There was general enthusiasm for the rapid progress being evidenced as GOOS moves from planning into implementation.

A new Chairman (Dr.Angus McEwan) was appointed to lead I-GOOS, along with two new Vice Chairmen (Francois Gerard and Vladimir Ryabinin).

3.1.2.1 Joint Data and Information Management Panel (J-DIMP)

The GCOS/GOOS/GTOS Joint Data and Information Management Panel (J-DIMP) held its third session 15-18 July 1997 in Tokyo, Japan. The meeting was hosted by the Japan Meteorological Agency (JMA), the Science and Technology Agency (STA), and the National Space and Development Agency of Japan (NASDA). The meeting was chaired by Mr T. Karl.

The objective of J-DIMP is to provide leadership to the G3OS in the development of their data and information management needs. In the case of GOOS, this means developing a GOOS data and information management plan, which is likely to be adapted from the GCOS data and information management plan produced by the J-DIMP=s predecessor. J-DIMP has to ensure effective and efficient access to data, products and information, and must ensure that users are provided with the highest quality data, products and information. The latter responsibility requires the application of scientific knowledge to adequately assess and build databases, products and information sources. A template was devised to guide the work of the J-DIMP, which will focus on data collection, data transfer, and data archiving, recognising that it is the responsibility of the GOOS module panels to consider the science issues, the

variables, the processing and the products.

The following principal activities were identified by the J-DIMP for the next inter-sessional period:

1. Revision of the Data and Information Management Plan
2. Consider the role of the "Information Center" (IC) as a source of information for the G3OS, and as a potential long-term G3OS element. The IC would:

   - focus on information systems,
   - point to other centers & information systems,
   - provide access, but will not hold data,
   - present information as held in the centers, without either creating or modifying the presentation.

   The group agreed that to meet the diverse GTOS needs, the IC must have considerable scientific input and collaboration with the GOOS and GTOS communities.

3. Conduct a pilot study to test the feasibility of registering selected existing data sets based on the development of a directory level of meta-data and a "guide" to the use of the data set. The guide would be based on the results of the most recent questionnaire contained in the conceptual model on documenting climatological data sets.

4. Follow-up on the Climate Indices and Indicators Workshop

5. Solicit funding for and (if successful) hold a workshop in the S.E. Asia region to examine end-user data information and products for policy-makers and environmental scientists particularly in the socio-economic sectors.

3.1.2.2 Global Observing Systems Space Panel (GOSSP)

Recognizing the need for a comprehensive approach to the various space-based observational activities for the global observing systems, the JSTC of GCOS, the Joint Scientific and Technical Committee for GOOS (J-GOOS), and the Steering Committee (SC) for GTOS have established a Global Observing Systems Space Panel (GOSSP).

The Global Observing Systems Space Panel (GOSSP) and the World Meteorological Organization (WMO) Commission for Basic Systems (CBS) Working Group on Satellites (WGSAT) held a joint meeting in Paris, France, 27 - 30 May 1997 hosted by the IOC. The objectives of the joint session were to realise a mutual approach to problems and to obtain coordinated solutions. One major aim of the GOSSP meeting was to create a coherent set of data requirements for global observing, and in the process to identify overlap or conflicting data requirements from climate related space-based observations. A second aim was to work towards development of a space plan that is valid for GOOS and GTOS, building on the space plan already developed for GCOS by this committee=s predecessor.

Noting that space agencies need the evaluation of satellite performance against user requirements to help to define future systems and to fine-tune existing systems, the Chairman presented to the plenary a methodology to evaluate satellite data. GOSSP, WGSAT, the CEOS Task Force and the CEOS Analysis Group (AG) have put efforts into establishing a relational database, listing requirements for science areas, and initiated the development of its analysis. Analysing the relation between requirements and specific applications will make it easier to specify, to validate and to update those requirements.

3.1.2.3 NEAR-GOOS

The second session of the NEAR-GOOS Coordinating Committee was held in the IOC WESTPAC Secretariat, on 14-16 May, 1997. The committee reviewed the Operational Manual for NEAR-GOOS, which was subsequently printed. It was agreed that increasing the number of users was critical for further developments of NEAR-GOOS, and each participating country was asked to increase its efforts to attract potential users. A NEAR-GOOS brochure was prepared and distributed to inform potential users that the operation of data exchange had started within NEAR-GOOS. A first NEAR-GOOS training course on data management was held at the Japan oceanographic Data Centre (JODC) in Tokyo, 13-24 October, 1997, and supported with funds from Japan and South Korea.

3.1.2.4 EuroGOOS

The first EuroGOOS Project Forum was held at Meteo-France, Toulouse, France, 11-12 September 1997. There were 95 meeting attendees, including Dr. Pierre Papon, acting for the Chairman of EuroGOOS, Dr. Nick Fleming, Director of EuroGOOS, and Dr. Jean Boissonnas, representing the European Commission. The object of the meeting was to review progress in the several EuroGOOS project areas, and develop a way forward, focussing on the need to spin up proposals for submission to the EC for funding.

EuroGOOS is an Association of 22 operational agencies in 14 countries, which is dedicated to promoting the development of GOOS especially in the European context, in the process providing a mechanism for considering the coherent development of European operational oceanography. It aims to develop regional GOOS operations in 5 areas: the Arctic, the Baltic, the Mediterranean; the Northwest Shelf (including the North Sea); and the Black Sea, and in addition to work on the global approach through an Atlantic-wide project jointly with the USA and Canada. To help it devise its strategic and implementation plans it has Science Advisory and Technical Plan Working Groups. Among other things the Technical Advisory Working Group has surveyed the state of the European infrastructure in technology, and its future requirements, and is evaluating the prospect of instrumenting European ferries as a means of gathering operational data. EuroGOOS has carried out a comprehensive survey of user requirements in several countries, and aims to complete and publish this for all European countries in due course. EuroGOOS has published a Strategic Plan and an abbreviated Implementation Plan, is working on a fully comprehensive Implementation Plan and a Science Plan, and has held a major conference to broadcast its aims and attract new partners (many of them in industry). The conference report will be published in January. EuroGOOS also intends to evaluate its potential economic contribution to marine markets and to carry out Capacity Building (technology transfer) in selected areas including the Mediterranean and the South Pacific. EuroGOOS has been particularly successful in Holland in getting the attention of Dutch Ministers. In general terms, the EuroGOOS approach can been seen as a useful way of getting agreement on concerted actions from a diverse range of partners.

The meeting was attended by several representatives of industry, who also made presentations. Industry sees its role in GOOS as being to: (i) input to strategy; (ii) develop sensors and instruments; (iii) develop systems; (iv) implement operational systems; (v) produce and distribute data products; (vi) export European products and services. There is commercial interest in: (i) equipment design and manufacture; (ii) system engineering and software; (iii) provision of services. To become more effective (profitable) industry needs: (i) partnerships with academia; (ii) a European Metocean Trade Association. Industry=s practical operational experience should be valuable in developing GOOS, so we should involve industry at an early stage.

The main body of the meeting was devoted to the activities of working groups.

Mediterranean Task Team Workshop Group Report: The task team is developing an EC proposal for a Mediterranean Forecasting System Pilot Project (MFSPP), whose goal is to explore the potential predictability of ecosystem and physical system fluctuations. It aims to show the feasibility of an operational system for predicting currents and biogeochemical parameters, and involves developing interfaces to users for disseminating results.

Arctic Working Group Report: For the GOOS Climate Module monitoring is needed of sea-ice cover; frequency of severe conditions; acoustic thermometry (eg Fram Strait). For the LMR Module they are still at research levels in fish stocks and plankton. For the HOTO Module more dialogue is needed to see how to develop it in this area. For the Services Module, sea-ice monitoring services have developed; concerted action is needed on surface currents.

Atlantic Working Group Report: The session dealing with the Atlantic was a precursor of a Workshop held at the Southampton Oceanography Centre in late October, when European requirements for civilian operational forecasts were discussed for the North Atlantic. The workshop goal was to identify and prioritise developments that would increase economic and social benefits for Europe within the Atlantic realm. The aim is to build on existing systems and on existing or planned research. It needs to be a joint venture with the USA and Canada. This work would make a European contribution to GODAE.

Baltic Workshop Group Report: Baltic GOOS is now called BOOS. It comprises a number of existing observing systems, many of them set up to meet the demands of HELCOM (The Helsinki Convention). The immediate goal is to increase the quality of the products. They have made an inventory of stations, and now need to identify a subset where data are exchanged. Some large science (ie research) programmes are incorporated, but coordination is needed. They are developing a matrix of products and users to show the value of the system. Data exchange has started. Now the focus is on: ice services; harmful algae; waves and currents. The ultimate aim is a high resolution operational model. At present there is too little use of the data; they need to explore how much more the data can be used.

NW Shelf Working Group Workshop Report: The goal is to develop integrated ocean services via EU concerted actions. The immediate objectives:

(i) create a network to develop and exchange analyses and forecasts, observations and services between EU agencies.
(ii) develop ESODAE (European Shelf-Seas/Ocean Assimilation and Forecasting Experiment) - inspired by GODAE.
(iii) form catalogue of operational observations.
(iv) quantify state and variability of large scale transport.
(v) spell out approach to data and information management.

Science Advisory Working Group (SAWG) Report: The SAWG's role is to provide a vision of long term objectives. Implementation will then be incremental. "The Science Base of EuroGOOS" is now in draft form and will be published early in 1998. A major topic is limits of predictability, as also is data assimilation.

Gridded Bathymetry Working Group: This exists to determine what needs doing to provide the best bathymetry to underpin shelf and ocean models. The grid will cover most of NW Europe, including the Baltic, but not the Mediterranean; the depth will extend to the base of slope. Resolution is 500m now, but may increase in coastal areas (eg fjords). An EC proposal will be prepared for submission in 1998.

Technology Advisory Group Workshop Report: This group exists to identify key technology projects required by EuroGOOS, and to analyse equipment systems already in routine use. A survey of the EU's technologies has just been finalised; results will be available shortly. Main results: need focus on: (i) antifouling; (ii) HF radar; (iii) remote sensing; (iv) buoy sensor packages. Need to identify end users and their needs.

Ferry Box Working Group Report: The plan is to design a sampling strategy and sampling devices for installation on commercial ferries to measure in real-time about 15-20 variables in European waters, and transmit data ashore. The technology for automated systems is developed and available. They plan to apply for a concerted action from the EC.

End Users Workshop Report: EuroGOOS has been using a standard questionnaire to extract information about users requirements in operational oceanography. Surveys have been completed for UK, Italy, Spain, Greece and are about to be completed for Denmark and Holland. The data show a consistent pan-European pattern emerging, which will help to justify calls to the EC for funding operational work. The data: (a) point to what is regarded as most important by the user community; (b) tell politicians that people feel that x, y and z are important; (c) confirm where we should be putting our effort; (d) tell us what kinds of products are needed. The output can be electronically available, eg on CD. Technically skilled volunteers are needed to work up the data properly to get the most out of them. A working group may be needed to collect together the results of all the EuroGOOS country surveys and interpret them in a pan-European manner.

The best information about operational needs comes from "educated" users. These are either: (a) substantial organisations or companies who do their own environmental work or hire others to do it for them, or (b) proxy end users (the companies or agencies servicing the needs of ultimate end users). Among the ultimate end users, the general public are not "educated" users, except where efforts have been made to show specialist interest groups (like fishermen or ships' captains) what benefits might accrue to them from operational services. Such efforts might include workshops, but these have been found to be labour intensive and extremely time consuming, and do not produce an answer significantly different from approaching "educated" users. Examination of end user requirements can be illuminating, for instance the discovery that cruise ships' captains bounce from eddy to eddy to pick up a quarter knot advantage here and there along track.

Cost-Benefit Workshop Group Report: EuroGOOS is intending to carry out a cost-benefit study as the basis for justifying investment by governments in its projects.

Capacity Building Workshop Report: EuroGOOS plans to invest some of its resources in capacity building for developing states, with emphasis on the Mediterranean and South Pacific. Developments are at an early stage.

3.1.2.5 GOOS Capacity Building

The primary goal of GOOS capacity building is to ensure that smaller and less developed countries can gain benefit from participation in GOOS. To lift the capacity of developing states requires assistance in creating appropriate institutional arrangements, in acquiring appropriate equipment and physical infrastructure, in training for its effective use and in raising the awareness of decision makers and the public.

To enable developing countries to form GOOS national and regional projects a GOOS Plan for capacity building has been developed in the form of a new TEMA Framework Planning Process, which was approved by the IOC's TEMA Group of Experts at its meeting in Bremen in May 1997. Later in July 1997, the IOC Assembly approved the report of the TEMA meeting and noted with satisfaction the present development and implementation of the new strategy and Framework Planning Process for TEMA capacity building.

GOOS capacity building workshops, developed under the leadership of Dr. Jan Stel, have continued on track in 1997 with the convening of the Regional Partners in Marine Science Workshop in Mombasa, Kenya during 10-14 March 1997. This built on the experience gained at the first such workshop convened in Goa, India during 18-19 November 1996. Participation included Belgium, Mozambique, the Netherlands, Kenya, Tanzania, United Kingdom, South Africa, and Sweden. The framework plan for the region is a LOICZ-oriented program with a strong linkage to the envisioned coastal module of GOOS. A steering committee was set up to continue work on the plan.

During 26-29 November 1997 a GOOS capacity building workshop, jointly supported by the IOC and UNEP, was convened in Malta to develop awareness about GOOS in the Mediterranean region and to explore cooperation in developing GOOS in the region. This workshop, focussing on a Mediterranean regional GOOS activity which will be known as MEDGOOS, and on Coastal GOOS, had been approved by the IOC Assembly in July 1997.

There were fourteen participants including representatives of Croatia, Cyprus, France Greece, Israel, Italy, Lebanon, Malta, Morocco, Spain and Turkey. Representatives from EuroGOOS, the Joint Research Centre of the EC, and MAP-UNEP also attended. The needs, capability, requirements for observing systems and training, and general interest in GOOS were identified for each country. One focus of attention was the Mediterranean Forecasting System being developed by EuroGOOS, which should provide a good foundation for developing GOOS in the region. The results of the workshop far exceeded expectations. Good progress was made in establishing regional cooperation in GOOS and the participants were focussed and worked hard. Excellent support was provided by the Malta government, particularly the Malta Council for Science and Technology.

The workshop essentially launched MEDGOOS. A memorandum of understanding between participating countries in MEDGOOS will be drafted and circulated by February 1998 for approval by interested countries/agencies. The MOU will be modelled on the EuroGOOS MOU, thus allowing for membership by interested agencies. A steering committee was established with an Executive Board comprising: Chair: Silvana Vallerga (Italy), Maria Snoussi (Morocco), Michel Glass (France), Cristopher Tziavos (Greece), Aldo Drago (Malta) and Umit Unluata (Turkey). Egypt will be invited to nominate a member. The Steering Committee and its Executive Board will develop the MOU and undertake the following tasks:

* Draft a MEDGOOS strategic plan by November 1998.

* Develop MEDGOOS, communicating information, recommending scientific and technical activities, overseeing the establishment of a network for data and information exchange.

* Identify organizations in the region that may contribute to and participate in MEDGOOS and initiate contact with them. Promote and disseminate information to the public.

* Plan two GOOS fora for the autumn of 1998, possibly in Lebanon and Morocco, to address decision makers, experts, mass media, funding agencies and the private sector. The purpose will be to highlight the socio-economic benefits of participating in GOOS, with a focus on solving environmental and climatological issues.

* A GOOS capacity building working group will be included in the strategic plan.

The workshop identified three projects that may become pilot projects under MEDGOOS. They are being planned by Morocco-Spain, France-Italy-Lebanon, and Malta-Italy. More details will be available in the Malta workshop report, which will be published early in 1998.

Progress has been made in organizing the GOOS capacity building workshop for the South Pacific region during mid-February 1998. This workshop, similar to the others, will seek to identify capacity in the region for undertaking GOOS activities. A survey of various capacities within the region related to human resources, existing monitoring systems, infrastructure, data systems and user requirements is underway. A distraction to the actual planning of the workshop is the preoccupation of raising sufficient funds to ensure that people from the region are able to attend. This is particularly a problem in the Pacific where travel costs are the highest in the world.

Following this (the fourth) GOOS Capacity Building Workshop a report will be produced to encapsulate the lessons learned and to provide a steer for the further development of Capacity Building to aid developing states to participate in and benefit from GOOS.

Cost-benefit analysis is one of the methods for estimating the value of investment in GOOS. It is not the only method, some member states being convinced by pragmatic rather than theoretical considerations. Nevertheless, it was agreed that efforts should be made to determine the costs and benefits of GOOS in three regions: south-east Africa; the Mediterranean; and Latin America. A start has been made on this through the capacity building workshops.

3.2 EXISTING ELEMENTS OF GOOS

3.2.1 The Global Sea Level Observing System (Gloss)

GLOSS is an international system initiated in 1985 and co-ordinated by IOC to provide high-quality standardised sea-level data from a global network of sea-level stations. The measuring system has become known as GLOSS because it provides data for deriving the Global Level of the Sea Surface, a smooth level after averaging out waves, tides and short-period meteorological events.

The Fifth Session of the IOC Group of Experts on GLOSS and the Workshop on geodetic fixing of Tide Gauge Bench Marks, jointly sponsored by the IOC and PSMSL took place at the Jet Propulsion Laboratory, Pasadena, California, from 17 to 21 March 1997. It was chaired by the new Chairman, Dr. Phil Woodworth, who replaced the long-standing Chairman Dr. David Pugh. Grateful thanks were recorded for the services of Dr. Pugh over the years, and also for the services of Mr. Albert Tolkatchev, the Technical Secretary of the GLOSS-GE, who took retirement in mid 1997.

The main subject for discussion was the revision to the GLOSS Implementation, which was subsequently published late in 1997. Among the results of the meeting a Technical Committee was set up to provide practical advice from experts on how to operate GPS at or near gauges.

A joint POL/IOC/CIESM training course on sea level measurements and analysis was held at the Proudman Oceanographic Laboratory (POL), UK, during 16-27 June, 1997. Several specialists from eight Mediterranean and Black Sea countries and invited speakers from several UK universities attended the course. The course programme included elements such as scientific aspects of sea level studies, demonstrations of tide gauge equipment, tide gauge data analysis and presentations by trainees on the operations of gauges in their own countries.

A meeting on European approaches to sea level and coastal protection was held in Barcelona, Spain during 9-12 April 1997. It was attended by most of the scientists in Europe concerned with sea level and climate studies and a book entitled 'Sea-Level Change and Coastal Processes: Implications for Europe' will stem from it. The GLOSS Programme, altimetry and related matters were well represented at the meeting and will be covered fully in the book.

An International Workshop on Climate Aspects of Sea Level was held at the University of Hawaii during 10-11 June 1997. This meeting, chaired by Dr. Neville Smith from Australia and funded primarily by NOAA, included presentations by a large number of sea level scientists and resulted in a very interesting debate about how to meet the requirements of the climate community for sealevel data. This has led to discussions about how IOC might reorganise the way in which it meets the broad needs of the community interested in sealevel measurements.

In September 1997, Professor A. Mesquita of the University of Sao Paulo, Brazil, represented PSMSL and GLOSS at the conference of the International Association of Geodesy (IAG) in Rio de Janeiro, Brazil, and presented a poster describing developments in GLOSS.

In October 1997, sea level was a central theme of the TOPEX/POSEIDON Science Working Team and the 'Monitoring the Ocean' conference in Biarritz, France.

Since 1933, the Permanent Service for Mean Sea Level (PSMSL) has been responsible for the collection, publication, analysis and interpretation of sea level data from the global network of tide gauges. The PSMSL is a member of the Federation of Astronomical and Geophysical Data Analysis Services (FAGS) of the International Council of Scientific Unions (ICS). It is based at the Proudman Oceanographic Laboratory (POL), UK. The PSMSL took a major lead in the original definition of |GLOSS and has ben primarily responsible for editing of the GLOSS Implementation Plan. All PSML data, including those from GLOSS stations can be obtained from PSMSL via ftp/web

or on CD-ROM. At the second session of the Conference of the Parties (COP 2) to the Framework Convention on Climate Change (FCCC) (Geneva, 1996), a CD-ROM with all sea level data available in PSMSL and a user handbook were presented and provided freely by IOC to the Small Island Developing States (AOSIS) member states. A contract between IOC and PSMSL was signed in 1997, as in previous years, to keep continuity of sea level data availability to all Member States participating in GLOSS.

3.2.2 Integrated Global Ocean Services System (IGOSS)

Apart from the routine tasks needed by an operational system such as IGOSS, 1997 was devoted to continuing implementing the specific decisions taken at the seventh session of the Joint IOC-WMO Committee for IGOSS (IGOSS-VII, Paris, November 1995), and most specifically those dealing with the international co-ordination and management of an operational Ship-of-Opportunity Programme (SOOP), for which IGOSS-VII had elaborated a plan. Following the first session of the SOOP Management Committee (Toulouse, France, 21-23 May 1996), the first session of the SOOP Implementation Panel (SOOPIP) was held at the headquarters of the Sea Fisheries Research Institute in Cape Town, South Africa, from 16 to 18 April 1997. The work of the panel was based upon three major inputs: (i) a survey of XBT resources compiled by the IGOSS Operations Co-ordinator upon the request of the SOOP Management Committee; (ii) the scientific requirements developed by various groups and in particular the Ocean Observations Panel for Climate (OOPC); and (iii) national reports on the present status and plans for ship-of-opportunity lines. From that information, the panel was able to analyse the network of XBT lines and propose solutions to mitigate its deficiencies. The panel further reviewed the data flow monitoring, the data quality control procedures, the most recent technological developments regarding upper ocean sampling and explored ways and means of enhancing the SOOP. The panel decided Athat SOOP was thus very much an existing operational component of GOOS.@.

The session had been preceded by the fourth meeting of the SOOPIP *ad hoc* Task Team on Quality Control for Automated Systems (TT/QCAS) (Cape Town, 14-15 April 1997). The task team suggested some modifications to its terms of reference, including the changing of its name into SOOP Task Team on Instrumentation and Quality Control (STT/IQC), to better reflect its true mission. With regard to data exchange, the Task Team reviewed the progress in the use of the new BATHY (bathythermograph report) code for data transmission over the Global Telecommunication System (GTS) of WMO and recommended modifications to the TESAC (temperature, salinity and current report from a sea station) and TRACKOB (report of marine surface observation along a ship=s track) codes. Regarding the instruments *stricto sensu*, it reviewed the status of evaluation of various XBT probes and of some recorders, as well as of XCTD (expendable conductivity temperature depth) probes, and took measures to allow that thermosalinographs could be used operationally in future.

The post of Mr Bruce Hillard, the IGOSS Operations Co-ordinator, was terminated by the end of June 1997. The United States of America decided not to re-second an officer to fill in the position, which they have done without interruption since 1979. It was agreed that the position of IGOSS Operations Co-ordinator would now be better placed at WMO headquarters, essentially for having closer access to the GTS. Pending a new secondment by another country (hopefully, Japan), WMO kindly agreed that the Ocean Affairs Division (att. Mr Mikhail Krasnoperov) of its World Weather Watch (WWW) Department would take over the basic responsibilities of the IGOSS Operations Co-ordinator on an interim basis.

The electronic IGOSS Products Bulletin (E-IPB) continued to develop, thanks to the activities of its editor, Dr Yves Tourre, the IGOSS Scientific Advisor. The E-IPB can be consulted at the following URL:

http://rainbow.ldeo.columbia.edu/igoss/productsbulletin

A demonstration of the E-IPB was made at the third session of the Intergovernmental IOC-WMO-UNEP Committee for GOOS (I-GOOS) (Paris, France, 25-27 June 1997). Through support of the IOC and the initiative of the Executive Secretary IOC in contacting the Climate Change Secretariat, an IGOSS Products Bulletin was demonstrated and presented at the third session of the Conference of the Parties (COP-3) to the Framework Convention on Climate Change (FCCC) (Kyoto, Japan, 1-10 December 1997). Dr. Y.Tourre made the demonstration and the Executive Secretary IOC provided a special briefing on ocean observations with a focus on IGOSS, emphasizing the connection to the Convention. Note was taken of the recommendation of COP-3 for continued maintenance and development of adequate observations of the climate system.

3.2.3 Data Buoy Co-operation Panel (DBCP)

The thirteenth session of the DBCP (St. Denis, La Réunion, France, 13-17 October 1997) encompassed a scientific and technical workshop, following the pattern established over recent DBCP sessions. Fourteen papers were presented to the 1997 workshop, covering three main areas of interest: technical developments, meteorological applications and oceanographic science and applications. The proceedings of the workshop will be published in the DBCP technical documents series.

The session was attended by 36 participants, from 11 countries and 5 organizations (including two representatives of manufacturers). According to the decisions reached at DBCP-XII, the session was divided into two main components, dealing with implementation and administrative issues, respectively. One item of particular importance within the implementation component was the review of a draft implementation strategy prepared by the vice-chairman during the inter-sessional period, as requested by DBCP-XII. Such an implementation strategy would be an essential input to the development of a comprehensive implementation strategy for the physical oceanography elements of GOOS and GCOS, in particular for climate and service modules. The panel decided on a procedure to prepare a final draft for submission to DBCP-XIV.

The increasing numbers of Action Groups (which, in addition to the European Group on Ocean Stations, the International Arctic Buoy Programme, the International Programme for Antarctic Buoys, the International South Atlantic Buoy Programme, the International Buoy Programme for the Indian Ocean and the Global Drifter Programme, will most likely include in the near future the TAO Implementation Panel) and the large variety of other activities in which the Panel is involved, testifies to the growth in importance of the Panel and its work.

Concern was nevertheless expressed regarding the potential effects of continuing budgetary constraints on contribution levels by existing contributors in future years, and the consequent impact of this on the future of the technical co-ordinator position. The panel agreed that the technical co-ordinator position was essential to the evident success of the panel, and that every effort should be made to maintain a budget sufficient to support the co-ordinator and other essential panel activities, while exercising maximum possible financial restraint. For the time being, only twelve countries participate in the panel funding.

Along with the usual practice, the seventeenth meeting on Argos Joint Tariff Agreement (JTA) was held after the DBCP session, from 20 to 22 October, in St. Denis again. One of the key issues was the negotiating of a preferential tariff for authorized users (who are represented by a government signing a Memorandum of Understanding with Collecte - Localisation - Satellites (CLS) / Service Argos and are government funded or considered as non-profit) in 1998. As at JTA-XVI, it proved not possible to implement the computation mechanism agreed at previous meetings, because the volume of activity under the Global Agreement was most likely to be too low. CLS/Service Argos agreed for the second year to take the risk of fixing a price which would be significantly below the one that would have resulted from the computation, because the company was keen to maintain a good spirit of co-operation with the JTA user community during a difficult, likely transitional period.

Another important issue was the recommendations made by the DBCP that: (i) the tariff structure should encourage full-time data collection, with a minimal impact on data collection costs, in support of the data requirements of operational meteorology and oceanography; (ii) the JTA should consider the provision of favourable tariffs for programmes that have both large numbers of platforms as well as common objectives for well-defined ocean-atmosphere missions, which operate over a long period to provide real-time data for GTS distribution; and (iii) any new tariff arrangements for the future should not disadvantage buoy operators who had participated in the Interim Argos Large International Programme (IALIP) under the 1997 tariff agreement and have expressed plans to continue in 1998. This led to the adoption of a few new basic principles for the 1998 and 1999 JTAs at least, among which the concept of a possible Abonus@ of 35% per year in the usage of the Argos System may be worth noting.

3.2.4 Global Coral Reef Monitoring Network (GCRMN)

The GCRMN, which was established in 1995 under the joint partnership of IOC, UNEP and IUCN, is a major component of the International Coral Reef Initiative. Its establishment was preceded by preparatory work in various committees beginning in 1992 and including the SIDS conference in Barbados in 1994. Following consultation with ad hoc groups of experts on the interim steering committee, a Global Coordinator was appointed in 1995 with funding provided by the USA. The Coordinator is co-hosted by the Australian Institute of Marine Science (AIMS) and the International Centre for Living Aquatic Resources Management (ICLARM).

The goals of GCRMN are to improve the conservation, management and sustainable use of coral reefs and to provide individuals, organisations and governments with the capacity to access the resources of coral reefs. A monitoring programme is being implemented by integrating existing programmes which are interested in participating in GCRMN and by establishing GCRMN monitoring programmes that incorporate biological, physical, social, cultural and economic studies that can identify trends in the health of reefs and distinguish between natural and human induced changes. The programme operates through six interacting regional networks that coordinate monitoring activities, training and database operations in participating countries. The regions are Pacific, East Asia, South Asia, Middle East, Western Indian Ocean-Eastern Africa, and Caribbean-Eastern Tropical Americas, each having one or more nodes through which coordination and funding takes place. Data and information on reef status and trends are maintained in a database at ICLARM. Annual summaries will be prepared and distributed to national and international organisations and agencies.

A strategic plan for the GCRMN has been prepared by the Steering Committee with the Coordinator and the co-sponsors, and published by the IOC in 1997. It provides the rationale, organisational structure monitoring mechanisms and reporting procedures for the GCRMN. Also recently re-issued by AIMS is a second edition of ASurvey Manual for Tropical Marine Resources.@ A management structure for the GCRMN has been put in place.

Through funding provided by the UK Department for International development an interim Regional Coordinator has been appointed for the South Asia region (India, Maldives, and Sri Lanka). The Coordinator is hosted by the IUCN in Colombo. Regional workshops have been organised to identify the challenges facing development of the GCRMN and to undertake practical field-based exercises on biological-physical sampling of reefs, data processing, training and socio-economic assessment techniques. Coordinators in several other regions are being identified and, when fully implemented, there will be about 20 coordinators located at designated government departments, universities or marine science organisations in the six regions.

A pilot reef monitoring project was initiated in the spring of 1997 to standardize methods and to gain an early synoptic view of the status of reefs. About 50 institutions and individuals are participating. The results of this project will be summarized and distributed in mid-1998.

A workshop, supported by the government of Japan, was convened in Bolinao, Philippines, in August 1997, to develop a draft manual describing rapid assessment methodology to gather social, cultural and economic data and related information on coral reefs to be used in parallel with biological-physical assessments. This draft manual will be completed in spring 1998 and will be provided to users for field testing in the Caribbean, South Asia, and the Philippines prior to final publication.

The first meeting of the Management Group of GCRMN was held on October 8 and 9, 1997, in Washington, DC. The group is composed of representatives from IOC, UNEP, IUCN, ICLARM, AIMS, and ICRI, along with the Global Coordinator and the Chairperson of the Science and Technology Advisory Committee (STAC). There was a full discussion of the programme and its progress to date, and plans for the next two years. There was general endorsement of the programme, which is moving from the planning phase to implementation. It is essential that support for its coordination continue. The report of the meeting will be published early in 1998.

At the Conference on Coral Reefs held at the World bank in Washington DC in September 1997, papers were presented by GCRMN=s Global Coordinator and the Chairperson of STAC.

The regional seminar on AMan and Coral Reefs@, 14-18 October, 1997, was held at the Centre National de Recherches Oceanographiques, Nosy Be, Madagascar. This seminar was co-sponsored by the Commission de l=Ocean Indien and IOC, within the framework of the new Memorandum of |Understanding between the two bodies. The purpose of this seminar was to raise awareness of regional scientists, coastal managers, and the public with regard to the important ecological, economical, an social role played by reefs. Discussions focussed in particular on the finalisation of a regional methodological manual for the monitoring of reefs, which was tested during a field trip, as well as the implementation of the GCRMN at the regional level. The meeting was attended by the GCRMN=s Global Coordinator and the Chairperson of STAC.

3.3 THE GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

Aspects of the programme of GCOS are reviewed in the section on GOOS dealing with the jointly sponsored GOOS and GCOS panels including the OOPC, J-DIMP, TAO-TIP, and GOSSP, and the Time Series Workshop. This report on GCOS does not include its work on the atmosphere nor its links to GTOS.

The VIIth session of the Joint Scientific and Technical Committee for GCOS was held in Eindhoven, the Netherlands, 21-26 September 1997. A wide range of topics were discussed, including reports of OOPC, GOSSP and J-DIMP. The following points emerged:

(i) a proposal was presented and accepted for a GOOS/GCOS/OOPC implementation workshop in Sydney in 1998; such a meeting between GOOS and the existing observing systems was considered long overdue;

(ii) the OOPC will need to develop end-to-end data-to-product demonstrations for the First GOOS Agreements Meeting;

(iii) J-DIMP does not expect (as J-GOOS had suggested it should) to be involved in product development;

(iv) the likely G3OS data systems will need to be evaluated to see how they are working; this means they will likely need science assessments (2-3 yr intervals); panel assessments (yearly); and operational data co-ordination (daily). The latter is consistent with the GPO suggestion that a person is needed to >run= a GOOS Data and Information Management Service;

(v) a proposal for a G3OS Information Centre (IC) was explored. It was decided the IC should start by focussing on climate. If that works well it could then extend to cover he oceans and land.

During the meeting there was a substantial discussion about the Integrated Global Observing Strategy (IGOS) of CEOS, for more on which, see above.

As far as the general progress of GCOS was concerned, income is falling dramatically next year. There is a need to convince Governments who believe that observing systems for climate already exist, that there is a real need for investment in GCOS. A sessional working group on Interaction with Governments noted (i) that the G3OS (GOOS, GCOS, and GTOS) need a clear vision, mission, and strategy, and brochures saying what has been achieved; (ii) that the G3OS share a common concept addressing integration and the sharing of common functionalities (data, satellites etc). The G3OS also need to show (iii) specific examples of existing capability (to demonstrate reliability); and (iv) use of data sets and services (to demonstrate usability). For implementation a road map is needed indicating contributions and funds required; setting priorities; and showing costs and benefits. Mechanisms and Opportunities: include the Kyoto meeting; a possible GCOS Participants= Meeting; involving GCOS in the GOOS Agreements Meeting. Regional GCOS meetings need to be organised to attract attention; site visits should be made to identify capabilities, address generic problem areas, spread the mission and ascertain GCOS needs locally. The JSTC needs to become more effective by developing more focus and by working inter-sessionally through Task Groups. In conclusion it was noted that both the Director of the GCOS Joint Planning Office and the Chairman of the JTSC will be stepping down in 1998.

3.3.1 Climate Indicators Workshop

A workshop on "Indices and Indicators for Climate Extremes", sponsored by CLIVAR, GCOS and WMO, was hosted by the NOAA National Climatic Data Center, in Asheville, North Carolina, USA, 3-6 June, 1977. Nearly 100 scientists and specialists from the insurance and reinsurance industry from 23 countries participated in the meeting. It addressed a number of issues including:

- Generating more comprehensive and reliable information for the IPCC (Year 2000) assessment of climate change related to the question "Is the climate becoming more extreme?";
- Identifying critical data sets required to address changes in climate extremes;
- Identifying, suggesting, and finding ways to correct inhomogeneities in the database required to address the question of changing climate extremes;
- Identifying specific indices or indicators that capture the multidimensional aspects of changes in climate extremes and can be easily calculated and readily understood;
- Finding ways to ensure that access to high-quality observations continue for those indices and indicators of primary interest;
- Identifying the type of information the insurance and reinsurance industry require regarding changes in climate extremes.

4. CAPACITY BUILDING IN MARINE SCIENCES, SERVICES AND OBSERVATIONS: TEMA

The Second Meeting of the TEMA Group of Experts for Capacity Building, was held at the Zentrum für Marine Tropenökologie, Bremen, Germany, 12-14 May 1997 (doc IOC/TEMA-CB-II/3). The twelve members of the Group participated, as well as two observers, from a bi-lateral funding agency and a Member State=s Ministry of Science and Technology, respectively. The agenda covered: a report on status of TEMA activities; the on-going strategy for the development of regional and sub-regional co-ordination and thematic networking; discussion of a TEMA framework plan for capacity-building, involving the role of regional and sub-regional IOC co-ordination and partner bodies (including efficient ways to interact with designated TEMA focal points); role of IOC research programmes and services and their TEMA focal points; elements of the strategy to attract financial and other forms of support; and, partnership with other capacity-building programmes in marine science and technology. The TEMA-Capacity Building

structure in the future organization of the Secretariat as well as a Work and Action Plan for TEMA, were other main items reviewed. The latter included a revision of the TEMA policy and strategies developed during the past 15 years; a conceptual framework for IOC-TEMA-Capacity building; elements for the organization, implementation and evaluation of TEMA-CB activities; communication and co-ordination within IOC=s TEMA activities; and, a revision of the membership for the Group of Experts. A last item was related to aspects on awareness building, specially referred to the 1998 International Year of the Ocean. To facilitate continuity in the actions carried out by the Group of Experts, the present officers were re-elected for the next intersessional period and the third meeting, that will be held in Lisbon, Portugal, in association with '98-IYO, tentatively from 15 to 18 June 1998.

The present implementation of the strategy for TEMA-Capacity building and workplan as proposed by the Group of Experts, was endorsed by the XIX Session of the Assembly, July 1997.

In the **Eastern Pacific** region (Mexico to Chile), the feasibility studies and project proposals from the TEMA Workshop held in Concepción, Chile, April 1996, were finished and summarized for further negotiation.

The head of the TEMA Capacity Building Unit participated at the XII Meeting of the CPPS Scientific Committee for ERFEN (Bogotá, Colombia, 6 - 9 October 1997) as well as co-chaired and delivered two lectures at the Joint CPPS/IOC/WMO Regional Co-ordination Seminar for the South Eastern Pacific held in the same place, 10 - 11 October 1997. Main subjects thoroughly covered during these two meetings were: an up-dated on the multi-sectorial impacts of the on-going strong El Niño phenomena and mitigation measures, for the four countries concerned (Colombia, Ecuador, Peru and Chile); and, the preliminary context for a GEF proposal, aimed at improving the sub-regional operational capabilities to model and forecast future events. The latter to be jointly presented and negotiated through the four countries and following the format suggested by the corresponding thematic group at the Concepción Workshop.

In the Framework Agreement between IOC (UNESCO) and FER(EU) and as part of the "Feasibility Study for the Implementation of a Network in Marine Science and Technology between Europe and Latin America", the second of the three workshops planned, was held in Rio Grande do Sul, Brazil, 3 - 11 November 1997, for the **Southwestern** Atlantic sub-region (Colombia to Argentina). The workshop was attended by 80 experts from South America, Europe, and representatives of funding agencies (IADB, IDRC-Canada, CNPq/FINEP-Brazil). Its results were compiled in general and specific actions and project proposals, which reflect national, sub-regional and regional priorities, as well as integrated common research for selected topics, with strong commitments of the institutions and organizations concerned.

The present implementation of the pilot project on networking for Latin America and the Caribbean, will be completed with a TEMA Pluridisciplinary Workshop on Wider Caribbean Networks on Integrated Coastal Area Management, to be held in Cartagena de Indias, Colombia, 2 B 7 March 1998, in the framework of the =98 IYO. Main co-organizers are IOC, FER and the Colombian Government.

Evaluation and planning for the IOC(UNESCO)/FER(EU) networking effort for LAC, for further implementation during 1998-1999, will be analyzed in a decision-makers international conference to be held in Madrid, Spain, 26 B 28 January 1998. The results, proposals and present implementation of this TEMA networking initiative, will be exhibited in the EU Pavilion, Expo=98, Lisbon, Portugal. Also in the context of the =98-IYO, a high-level conference for decision-makers and Latin American and European leaders, specifically concerned to the problem of Integrated Coastal Area Management, will be organized at Bordeaux, France, October 1998.

The head of the TEMA-Capacity Building Unit was invited, to lecture on networking strategy, in the context of the Workshop on Insular Coastal Area Risk Management in the Mediterranean, organized by ICOD/MEDISLE, 15-17 October 1997, in Malta. The lecture also provided information about the evolving role of IOC, relevant to the topic of Integrated Coastal Area Management. Examples of on-going TEMA activities related to ICAM were emphasized. The latter focused on IOC's traditional strengths in encouraging participation through networking and data and marine information management, taking advantage of the active support of the Commission's global and regional Groups of Experts for IOC scientific programmes and services.

A number of study and travel grants were conferred to individuals/organizations, to allow participation on marine science and services meetings or courses, as well as to cover partial expenses of post-graduate studies.

During 1997 a number of training courses/seminars/workshops were implemented through the subject area and regional programmes as part of the overall IOC TEMA-Capacity Building efforts, and as part of the GOOS development, special efforts were made as part of the overall TEMA programme for GOOS Capacity Building.

IOC Co-sponsored TTR Activities

1. The Executive Committee meeting and International Congress on >Gas and Fluids in Marine Sediments= (Amsterdam, 27-29 January) of the Training through Research programme was attended by scientists and

students from Belgium, France, Germany, Italy, The Netherlands, Russia, Spain, Switzerland, Turkey, UK, and USA. The results were published as the IOC Workshop Report No. 129.

2. The TTR-7B cruise was carried out in the Eastern Mediterranean between 1-8 June. Seventeen (17) teachers and students from Italy, the Netherlands, Russia, Switzerland, Turkey, and the United Kingdom participated.

3. The TTR-7A cruise was carried out from 1 July-16 August 1997 in the NE Atlantic Ocean with the participation of 59 representatives from Belgium, Denmark, France, Ireland, Italy, The Netherlands, Russia, and UK. The TTR-7 results will be published in the IOC Technical Series.

4. The TTR-6 cruise results were published in the IOC Technical Series as No.48 (entitled >Neotectonics and fluid flow through seafloor sediments in the Eastern Mediterranean and Black Seas=).

5. The Floating University Annual Report (1996) was published (under the IOC logo).

6. The Baltic Floating University (BFU) UNESCO-IOC-HELCOM preparatory meeting took place in St. Petersburg between 27-28 May attended by scientists from Estonia, Finland, Germany, Lithuania and Russia.

7. The BFU-97 expedition in the Eastern Baltic (Leg 1: 16-25 July, Leg 2: 12-30 August) was organized.

8. The UNESCO-IOC-HELCOM BFU Mid-Cruise workshop (with the participation of Finland, Russia, HELCOM and SULA) took place between 27-28 August in Helsinki, Finland. The results are being published by SULA.

9. Within BFU, the Russia-Finland coastal marine studies were carried out between 9-30 July in the southern part of the Gulf of Finland, and the Estonia-Finland-Russia coastal marine expedition was carried out between 19 August- 8 September in the Estonian waters in view of gathering a background information needed for creating a Marine Protected Area around the Hiiumaa biosphere reserve (MAB-established).

10. The UNESCO-IOC-HELCOM BFU Research Bulletin No. 2 was published.

11. As part of BFU, yet another coastal marine (national) expedition took place in July-August in the Barents-White Sea area, and an international Russia-Finland-SULA seminar was organized on August 3-5 in the White Sea Region. The results are being published by RSHI (St. Petersburg).

GOOS CAPACITY BUILDING

The primary goal of GOOS capacity building is to ensure that smaller and less developed countries can gain benefit from participation in GOOS. To lift the capacity of developing states requires assistance in creating appropriate institutional arrangements, in acquiring appropriate equipment and physical infrastructure, in training for its effective use and in raising the awareness of decision makers and the public.

To enable developing countries to form GOOS national and regional projects a GOOS Plan for capacity building has been developed in the form of a new TEMA Framework Planning Process, which was approved by the IOC=s TEMA Group of Experts at its meeting in Bremen in May 1997. Later in July 1997, the IOC Assembly approved the report of the TEMA meeting and noted with satisfaction the present development and implementation of the new strategy and Framework Planning Process for TEMA capacity building.

GOOS capacity building workshops have continued on track in 1997 with the convening of the Regional Partners in Marine Science Workshop in Mombasa, Kenya during 10-14 March 1997. This workshop built on the experience gained at the first such workshop convened in Goa, India during 18-19 November 1996. Participation included Belgium, Mozambique, the Netherlands, Kenya, Tanzania, United Kingdom, South Africa, and Sweden. The framework plan for the region is a LOICZ-oriented program with a strong linkage to the envisioned coastal module of GOOS. A steering committee was set up to continue work on the plan.

Progress has been made in organizing the GOOS capacity building workshop for the South Pacific region during mid-February 1998. This workshop, similar to the others, will seek to identify capacity in the region for undertaking GOOS activities. A survey of various capacities within the region related to human resources, existing monitoring systems, infrastructure, data systems and user requirements is underway. A distraction to the actual planning of the workshop is the preoccupation of raising sufficient funds to ensure that people from the region are able to attend. This is particularly a problem in the Pacific where travel costs are the highest in the world.

5. REGIONAL ACTIVITIES

5.1 IOC SUB-REGIONAL COMMISSION FOR THE CARIBBEAN AND ADJACENT REGIONS (IOCARIBE)

The IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE) has focussed its activities on the implementation of the IOCARIBE Medium Term Strategy 1996-2000. The main three Strategic Programmes included in the Strategy are receiving priority action:

(i) National Marine Policies and Coordinating Structures

A survey to establish the degree, level and capacity of the existing national policies on marine affairs and marine sciences in Member States has been updated and the proposed Terms of Reference and duties of the NFP has been circulated among Member States. In this respect, IOCARIBE is encouraging the creation of National Oceanographic Commissions as coordinating structures in Member States.

(ii) Capacity Building

An initial effort to have a real diagnosis of the needs for capacity building and TEMA in the Caribbean Region has been done with the production of the Document AMarine Science Capacity and Structure in the Caribbean and Adjacent Regions@. This document includes updated information of the current marine science structure and capacity in the IOCARIBE Member States. The main goal of this activity is to know the weaknesses and strengths related to institutional structure, their policies, national authorities and scientific capacity, as well as to provide a real dimension of their problems and needs. This document was presented to the IOC Assembly in June 1997 as part of the IOCARIBE report. The Assembly acknowledged with satisfaction this document and recognized that it comprises essential information for strategic regional planning and future capacity building. The Secretariat is arranging to have this information synthetized and displayed in the IOC Homepage on WWW with the possibility for the countries not only to consult it, but eventually to have the opportunity to update the information on-line.

(iii) Information Management and Networking

The IOCARIBE Database known as AIOCARIBE Yellow Pages@ which includes Marine Institutions and Scientists in the region has been enlarged and part of it is already displayed on the IOC Homepage. To strengthen the information management component in the Secretariat the establishment of an incipient network of NFPs for marine information and integrated coastal management (MIM-CAM) is being started with the support of Dr. Alan Duncan and COASTAS (Centro de Estudios para el Manejo de las Zonas Costeras).

The Government of Colombia provided IOCARIBE with additional space for the office as an increase of the Colombia Contribution. The space is located in the same mezzanine of the Casa del Marquez de Valdehoyos. In this office has been located a UNESCO-CSI Project for the Cartagena Bay, and is intended to serve as temporal office for scientists coming to IOCARIBE to implement specific regional projects and/or for experts performing field studies and associated experts from Member States.

The IOCARIBE Assistant Secretary presented the Progress report to the Nineteenth Session of the IOC Assembly (Paris, July 1997), and the Document AMarine Science Capacity and Structure in the Caribbean and Adjacent Regions@. This document was accepted and endorsed by the IOC Assembly.

Member States acknowledged that the Sub-Commission has gone through a renewal process and is ready to move into an important implementation phase using new schemes, including joint planning with other regional organizations for managing regional projects.

They also noted that IOCARIBE needs to have a permanent UNESCO Post for the Regional Secretariat at an appropriate level, to officially represent IOCARIBE and to have a sustainable medium term planning and implementation of regional scientific projects.

Implementation of Regional Projects

The IOCARIBE Secretariat is carrying out several regional programmes involving the whole Caribbean area:

(i) Monitoring, Assessment and Sustainable Management Programme for the Caribbean Large Marine Ecosystem (CLME) and Adjacent Regions. The objectives of the project are to develop, under the support of a GEF Block B grant, national and regional efforts towards collaborative international assessment, monitoring and management of the CLME.

(ii) In the framework of the IOCARIBE GOOS regional project, the Sub-Commission provided support for three (3) participants to attend the Conference on the Transport and Linkages of the Intra-Americas Sea

(Cozumel, Mexico, 1-5 November, 1997). The Conference was also sponsored by the Intergovernmental Oceanographic Commission (IOC) and the US Mineral Management Service (MMS). The meeting was attended by 52 scientists and experts from the Intra-Americas Sea (the Gulf of Mexico, Caribbean Sea, The Bahamas, The Guianas, and their environs). Further arrangements are being considered to initiate a GOOS regional project based on results of this Conference and other OPC regional activities.

(iii) As an outcome of the Fifth Intergovernmental Session of the Sub-Commission held in Barbados (December 1995), the IOCARIBE Sub-Commission has been working on the implementation of the Caribbean Tsunami Warning System. This project is under the Ocean Processes and Climate (OPC) as an IOC regional program. To address the Tsunami hazard in the Caribbean the IOCARIBE Sub-Commission has organized and co-sponsored two meetings related with this aspect (a) IOCARIBE Tsunami Warning System Workshop (with the University of the Virgin Islands, St. John, US Virgin Islands, May 23-24, 1996), and, (b) Caribbean Tsunami Workshop (organized by the University of Puerto Rico in Mayaguez, Puerto Rico, 11-13 June, 1997). Both meetings were attended by scientists and experts from the whole Caribbean Area. Mr. Michael Blackford, Head of the International Coordination Group for the Tsunami Warning System in the Pacific (ITSU) participated and provided inputs based on his experience in the Pacific to benefit IOCARIBE Member States. The IOCARIBE Secretariat is intended to serve as the coordinating body in the Caribbean area for Tsunamis efforts and be able to contact and inform the scientific community about this permanent hazard.

(iii) With the support of UNESCO, IOCARIBE is coordinating through COSTAS (Centro de Estudios para el Manjo de las Zonas Costeras - a non-profit organization) and under the framework of the AEnvironment and Development in Coastal Regions and Small Islands (CSI)@, the Project UNESCO-CSI-COSTAS on Decision Making for the Management of the Cartagena Bay and its influence zone. The objective of this project is to provide a basis for integrated coastal planning and management with particular reference to maintaining the integrity of coastal ecosystems.

The IOCARIBE Symposium

The IOCARIBE Symposium is one of the activities that the Sub-commission has prepared with the ocasion of the International Year of the Ocean: 1998. The main objectives of the First IOCARIBE Symposium are to promote the exchange of information and transfer of knowledge to keep people up-to-date with activities ocurred within their region. The Symposium is to take place in November 1998 in Cartagena, Colombia.

Coordination with other Regional Organizations

Following one of the IOCARIBE=s strategic principles referred in the IOCARIBE Medium Term Strategy, 1996-2000, the Sub-Commission is redefining its role in the institutional scenario of the region. A niche must be strengthened for IOCARIBE, where relative advantages are identified based on differences with and complementary other organizations, both intergovernmental and non-governmental.

In the process of building this niche, the IOCARIBE Secretariat has established further contacts with the UNEP Office in Kingston, Jamaica, to strengthen the cooperation between the two organizations and work closely in the development of cooperative bilateral projects for the Caribbean Region. A Coordinating mechanism is being structurated to specify terms of reference to manage regional projects between UNEP and IOCARIBE Dr. Nelson Andrade, Director of the UNEP Office in Kingston, Jamaica visited IOCARIBE Headquarters.

The IOC Acting Secretary for IOCARIBE attended the third Meeting of the Executive Board of the Association of Caribbean States (ACS) Ministerial Council (Cartagena de Indias, 27-28 November 1997). During this meeting initial contacts were established to further convene a Cooperation Agreement between the ACS and IOCARIBE to coordinate efforts in order to serve as technical support for all ACS=s initiative carried out in the region as well as to develop the collective capabilities of the Caribbean to develop national marine science capacities. The Association of Caribbean States promotes the preservation of the environment and the conservation of the natural resources of the region especially the Caribbean Sea.

Events

IOCARIBE has participated and/or played an organizational role in the following meetings during 1997:

- Board of Officers of IOCARIBE First Meeting 1997 (Miami, Florida, 2-29 January 1997)
- IOCARIBE Large Marine Ecosystems (LME) Planning Session for the Caribbean and Adjacent Regions (SEFSC/NMFS, Miami, Florida, 30-31 January 1997)

- Caribbean Tsunami Workshop (Mayaguez, Puerto Rico, 11-13 June 1997)
- IOC XIX Assembly (Paris, 2-18 July 1997)
- Coastal Zone 97 (Boston, MA, USA, 20-24 July 1997)
- Board of Officers of IOCARIBE, Second Meeting 1997 (Conference Call, 21 October 1997)
- IOCARIBE Sponsored the participation of three (3) participants to the Conference on the Transport and Linkages of the Intra-Americas Sea (Cozumel, Mexico, 1-5 November 1997)
- First National Seminar on Integrated Management of Coastal Zones and fourth Workshop towards the Environmental Ordinance of our Coastal Zones (Cartagena de Indias, 19-21 November 1997)
- First Regional Forum of the Civil Society of the Caribbean (Cartagena de Indias, Colombia, 23-26 November 1997
- Third Meeting of the Executive Board of the Association of Caribbean States (ACS) Ministerial Council (Cartagena de Indias, Colombia, 27-28 November 1997).

5.2 IOC SUB-COMMISSION FOR THE WESTERN PACIFIC (WESTPAC)

During the year of 1997, the actions within the IOC Sub-Commission for WESTPAC concentrated on the implementation of the work plan approved during the Third Session of the Sub-Commission, Tokyo, 1996. In this workplan, the WESTPAC programme activities is formulated as activities which contribute to solving global and regional problems, basically as a follow-up to UNCED. Also in agreement with the recommendation of the Third Session, emphasis was put on strengthening efficient co-operation with other organizations within the region.

In relation to the global programmes of IOC, certain activities were carried out to reinforce their regional implementation. In this respect, the progress is noteworthy in the GOOS regional component of NEAR-GOOS, the HOTO regional initiatives and Integrated Coastal Area Management.

5.2.1 Systematic Monitoring and Research

It was widely recognized by member states that the systematic observation and monitoring are key issues in understanding the natural processes of the marine environment. It is further evident that capacity-building in these aspects and efficient co-operation and co-ordination of national and regional activities are essential for the success of these projects. WESTPAC has concentrated on:

5.2.1.1 Development and operation of NEAR-GOOS

Second Session the NEAR-GOOS Co-ordinating Committee and the Operation, Bangkok, 14-16 May 1997

After the 1st Session of the NEAR-GOOS Co-ordinating Committee and the 29th Session of the IOC Executive Council, the NEAR-GOOS has now officially started its operation. The 2nd Session of the Committee was held in the IOC Regional Secretariat, Bangkok, Thailand from 14-16 May, 1997. The progress in system operation was reviewed, and discussions were held with respect to the future operation and development of the system, including the production of an operation manual, the encouragement of participation by various users, and a wider contribution of oceanographic data to the system. A representative from EuroGOOS attended the meeting in order to exchange views and experiences between the regional components of GOOS.

All participating countries are contributing oceanographic data in different ways and formats. The data are provided in a Real-time Database and a Delayed Mode Database. Registration of users is gradually increasing, resulting in more participation and more contribution. The operation of the system was reported to the 19th Session of the IOC Assembly, and the Assembly expressed its satisfaction on the development and operation of NEAR-GOOS, in particular the open-data policy, which is one of the important principles of GOOS.

Efforts are still needed to encourage wider participation in and better contribution to the system. In order to achieve this, a revised operation manual is currently being prepared by a member of the NEAR-GOOS Co-ordinating Committee. The next meeting for the Committee will be held in China, first half of 1998, as decided by the Committee.

The first training course on NEAR-GOOS data management was held at the Japan Oceanographic Data Center (JODC) in Tokyo, 13-24 October. Seven trainees from South Korea, Russia and Vietnam participated in the course. In addition to financial support from Japan, South Korea made a financial contribution towards the participation of its trainees.

5.2.1.2 HOTO regional pilot projects

During the Third Session of HOTO (1996), it was suggested that regional pilot projects should be developed in order to demonstrate the implementation of the HOTO Strategic Plan at a regional level. Among the three regional

pilot projects identified by the panel, two are in the WESTPAC region, i.e. the HOTO regional pilot project in the North East Asian Region (NEAR-HOTO) and another proposed for the South East Asian region. The project proposal was prepared and presented at the 4th HOTO Panel meeting in Singapore, October 1997. IOC/WESTPAC Secretariat is working closely with the HOTO Panel in the implementation of these pilot projects in order to ensure appropriate co-ordination with other regional programmes, e.g. NOWPAP/3.

5.2.2 Capacity Building And Training

5.2.2.1 Musselwatch

As discussed with UNU on several occasions, a jointly organized Training Course on Heavy Metal, Organochlorine Pesticides and Polychlorinated Biphenyls Analysis within the framework of the International Mussel Watch is currently under preparation. The Training Course is planned to be held in Bangkok, Thailand, 2-13 March 1998. UNU has agreed to co-sponsor it and committed 20.000 US$. The remainder is provided under the IOC-Sweden (SIDA/SAREC) programme for the Western Pacific.

5.2.2.2 HAB Training Course

Following the second IOC/WESTPAC Training course on Species Identification of Harmful Microalgae, Tokyo, 28 February - 8 March 1997 , the third training course of the series was held in Tokyo on 22-30 August 1997 with financial support of Japan under the leadership of Professor Yasuwo Fukuyo of the Asian Natural Environmental Science Center, University of Tokyo. Out of 31 applicants from 12 countries within and outside WESTPAC member countries, 15 participants were finally selected, coming from: China, Fiji, Indonesia, Korea, Malaysia, Philippines, Thailand, and Vietnam. Two of the participants are planning to have in-country training courses in 1998 in their own countries, Thailand and Malaysia.

5.2.3 Contribution to Integrated Coastal Area Management

5.2.3.1 Gulf of Thailand Project

The Gulf of Thailand project was endorsed during the Third Session of the IOC Sub- Commission for WESTPAC (Tokyo, 1996). It was recognized in an early stage that the Gulf of Thailand project would span over a number of fields relevant to integrated coastal area management. The project involves several collaborators, and will function as a bridge between science and policymaking in the framework of joint management of this international semi-enclosed sea.. A first essential part in the project was to draw up a scientific plan, accompanied by a plan oriented towards the policy aspects of management. This has been done during 1997. A number of activities have been organized which provide input to the Gulf of Thailand Project.

(i) Workshop on the International Co-operative Study in the Gulf of Thailand, 25-28 February 1997

The workshop was organized in the IOC/WESTPAC Regional Secretariat, Bangkok, Thailand 25-28 February 1997, in co-operation with SEAPOL. Participants from four coastal countries, Cambodia, Malaysia, Thailand and Vietnam, and experts from Canada, SEAFDEC and SEAPOL participated in the workshop.

The Draft Scientific Plan was discussed, and finalized during the workshop. Special attention was given to the scientific understanding of the Gulf of Thailand, and relevant management problems. During the meeting, the project leader presented a homepage together with a database, through which all persons who are interested in the Gulf are able to access information and marine environmental data.

For future activities the workshop proposed monitoring, research and capacity building in the countries concerned.

(ii) Preparation of the Training Course for the Gulf of Thailand Project

In co-operation with Sweden (SIDA/SAREC), and the Southeast Asian START Regional Centre, an IOC/WESTPAC Training Workshop on Operational Data and Information Network for the Gulf of Thailand was organized in Bangkok, Thailand, 18-21 November 1997. Scientists from the surrounding countries of the Gulf, namely Cambodia, Malaysia, Thailand and Vietnam participated. The workshop has allowed the representatives of the various countries to discuss common data formats and the exchange of data.

(iii) Preparation of a Framework for the Gulf of Thailand Project

The Gulf of Thailand Study encompasses two components, a policy plan and a science plan. While the science plan has been largely elaborated, the policy plan has not yet been written. Discussions were held with various resource persons to produce the material for a policy proposal which complements the science plan. A draft proposal is currently being prepared. The policy framework basically functions as a reference for the way science can contribute to the management and monitoring of the Gulf of Thailand. The basic presumption is that the Gulf of Thailand Project will produce tangible results which show their value to policymakers and scientists alike. Final versions of the science and policy plan will be presented to WESTPAC Sub-Commission at the 1998 4th WESTPAC Scientific Symposium.

5.2.3.2 Paleogeographic Map Workshop

Paleogeographic maps provide a useful source of information for coastal zone management, in particularly with respect to coastline changes and sea-level rise. Following the success of the compilation and publication of the WESTPAC Paleogeographic Map of the Last Glacial Maximum, the IOC/WESTPAC-CCOP workshop on Paleogeographic Map for the Holocene Optimum was organized in Shanghai, China, 27-29 May 1997. The workshop reviewed the existing national and regional efforts on the subject, and decided to compile and publish the map in coloured hard copy (1:10,000,000), and in the format of a CD-ROM of data maps, a table of sites and a table of datings. It was agreed that the next meeting for final compilation should be organized in the second half of 1998.

5.2.4 IOC Global Programme

(i) Networking for the Global Coral Reef Monitoring Network

Discussions were held with UNEP Regional Seas Programme in Bangkok to see how WESTPAC could support the Global Coral Reef Monitoring Network. During the ICRI second regional workshop for the East Asian Seas held in Okinawa in March 1997, South-east Asian countries expressed their interest in establishing national programmes rather than joining/having to report to a regional subnode. Active networking with both NGO's and the Academic institutions is proposed to maintain the momentum. A proposal has been written in collaboration with the National Commission of UNESCO in Thailand for the in-field testing of the GCRMN socio-economic survey methodology. The methodology was elaborated during a workshop in Bolinao, Philippines in August of 1997.

5.2.5 Co-operation with other Organizations

5.2.5.1 UNEP

(i) NOWPAP Implementation

As adopted by the 2nd Intergovernmental Meeting for NOWPAP (1996), a MOU between UNEP and IOC on the joint implementation of projects NOWPAP/1 and /3 was signed. The associated funds amount to about US$ 200,000. The IOC/WESTPAC secretariat has started the implementation of the two projects on the establishment of a comprehensive database and information management system and on the establishment of a collaborative, regional monitoring programme, respectively. Proper co-ordination with NEAR-GOOS and a HOTO regional pilot project are ensured, endeavoured as part of the implementation.

As part of the projects NOWPAP/1 and 3, eight contracts for the preparation of national reports have been prepared. Project implementation has been discussed with relevant Japanese organizations. Consultants were identified by UNEP in consultation with the IOC/WESTPAC secretariat.

(ii) Co-operation on the Development of GEF Project Document GPA/LBA

In co-operation with the UNEP Regional Co-ordinating Unit for East Asian Seas, two activities have started:

a. Formulation of a Transboundary Diagnostic Analysis for the South China Sea; and

2. Implementation of the Global Programme Action for the Protection of the Marine Environment From Land Based Activities in the East Asian Seas Region.

As regards the former one, the IOC/WESTPAC Secretariat has had discussions with UNEP staff concerned in developing the project document, and provided expertise in the role as Senior Advisor to the project. IOC/WESTPAC was represented at the First Meeting of the Project held in Bangkok, Thailand, 31 March - 4 April, 1997 by Dr. Aprilani Soegiarto.

With regard to the regional GPA/LBA, Dr. Micheal Huber represented IOC at the regional workshop held in Cairns, Australia from 30 April - 3 May 1997. IOC programmes on GIPME, GOOS, HOTO and regional activities in WESTPAC were introduced to the meeting.

5.2.5.2 ESCAP

(i) 39th Session of the Subcommittee on Water for Asia and the Pacific

IOC/WESTPAC participated in the 39th Session of the Subcommittee on Water for Asia and the Pacific held on June 12 in Bangkok. It was organized by the Environment and Natural Resources Management Division of ESCAP as an Inter-Agency Meeting with participation from UNDP, UNICEF, FAO, UNESCO, UNIDO, WHO, and ESCAP. The possible contributions from each agency to (a) rehabilitation of water quality in contaminated rivers; (b) the promotion of private sector participation in water supply and sanitation; and (c) the promotion of efficient water use in urban areas, were presented. The subcommittee decided to enhance the exchange of information among the agencies through use of Internet.

(ii) ESCAP Expert Group Meetings

IOC/WESTPAC was invited to participate in two ESCAP expert group meetings in Bangkok. The first held in September 1997 focused on integrated coastal zone management and non-living resources development. A second held in December 1997 focused on policies in sustainable development of land and mineral resources in the Asian and Pacific region. Papers highlighting some of the IOC/WESTPAC activities in the field of ICAM and non-living resource development were prepared and presented.

5.2.5.3 CCOP

During their visit to the WESTPAC region, the Executive Secretary IOC, Dr. Kullenberg and Dr. Roy Green received a visit of Dr. Kim, Director of CCOP Technical Secretariat in the WESTPAC office, and further discussion on co-operation between two organizations was held in the CCOP Technical Secretariat. Follow-up actions include the joint workshop on Paleogeographic Mapping mentioned previously, and the workshop planned for 1998.

In addition, IOC/WESTPAC was represented at the 34th Session of the CCOP Annual Meeting in Taejon, Korea, 13-16 October 1997. The member countries and co-operating countries expressed their satisfaction on the co-operation between the two organizations.

5.2.5.4 IMO/GEF

IOC participated in a Regional Workshop on Partnerships in the Application of Integrated Coastal Management held in Chonburi, Thailand, 1997 and the Project Steering Committee meeting in Hanoi, Vietnam, December 1997. IOC/WESTPAC expressed its interest in co-operation in the field of monitoring, marine pollution prevention and management.

5.2.5.5 Sweden (SIDA/SAREC)

Under the framework of the IOC-Sweden (SIDA/SAREC) Marine Science Programme, activities in the WESTPAC region are gradually planned and implemented. Co-operation with donors is not only important from a financial point of view, but also in the strengthening of the co-ordination of activities in the region. A good example is the IOC/WESTPAC-UNU Training Course as part of the mussel watch project. The two organizations have agreed to co-sponsor the training workshop on a cost sharing base. This will lead to implementation of the project after 3 years of planning, and will be beneficial to the member states.

5.2.5.6 ROSTSEA

During a visit to the UNESCO Jakarta Office on June 4-7, 1997 from the IOC/WESTPAC Secretariat, the co-operation between IOC/WESTPAC and the UNESCO Office in regard to marine science in the coastal region was discussed. The offices maintain contact.

5.2.5.7 SEAPOL

The co-operation with SEAPOL has been very successful over the last year, with attending and co-sponsoring activities within the framework of the Gulf of Thailand Project.

5.2.6 Other Activities

(i) Preparation of the 4th IOC/WESTPAC International Scientific Symposium

Preparations are underway for the 4th IOC/WESTPAC symposium to be held in Okinawa in February of 1998. The WESTPAC Secretariat in conjunction with the Local Organizing Committee in Japan has started: (i) organizing the workshops of the WESTPAC Projects as side-meetings to the Symposium, and (ii) request to member states for financial support for the participants from developing countries. It is expected that the Symposium will attract a great number of scientists from all over the WESTPAC region.

(ii) Publication of the WESTPAC Newsletter

The sixth issue of the WESTPAC Information, the newsletter for the Sub-Commission, was published by the IOC Regional Secretariat for WESTPAC and sent to the IOC member states in October, 1997.

(iii) WESTPAC Missions

The Executive Secretary, Dr. Kullenberg accompanied by Dr. Green visited countries of Southeast Asia, Indonesia, Malaysia, Philippines and Thailand in order to promote the knowledge and understanding of IOC's role and operations in the region and to seek advice on how IOC can better meet national and regional needs, improve national liaison mechanisms and solicit areas/projects in which IOC's capabilities and competences can be of value. The mission has led to a better understanding of the countries with respect to the IOC competences and role, and has provided for ample follow-up.

Another IOC mission held in the WESTPAC region was the HOTO and GIPME Mission by Drs. Neil Anderson and Michael Bewers. This provided an opportunity for planning and implementation of the HOTO regional pilot projects in WESTPAC region, and for introducing the state of development of GIPME and related GOOS activities to Thailand, Singapore, China, Korea and Japan. On their visits to Bangkok, Beijing, Seoul and Tokyo they were accompanied by Mr. Yihang Jiang.

These missions are judged of special importance in an international context because of the economic development of the many countries in the region and the heavy, and increasing, reliance on and exploitation of marine resources. As in other areas of the world, such activities may result in conflicts among interests in development and protection of marine resources and amenities that, ideally, require to be resolved to achieve sustainable development and maintenance of biological diversity. Thus, the region represents an important area for expanding GIPME monitoring activities including associated training and inter-comparison exercises and implementing GOOS pilot projects particularly with regard to the HOTO and Coastal Modules.

5.2. 7 Operation of the Secretariat Office

During 1997, IOC Regional Secretariat welcomed two new staff, Dr. Mitsumoto and Mr. Kuijper. Regular staff meetings were held on the different topics to exchange information, views and to discuss various matters related to the implementation of the regional projects and operation of the secretariat office.

The IOC Secretariat in Paris provides strong support in implementing the regional projects for WESTPAC, in particular, management of the programme budget and administrative assistance. The regional Secretariat has obtained extra-budgetary projects from UNEP and from Sweden through SIDA/SAREC, which greatly enhanced the regional project implementation.

The Regional Secretariat has continued to receive the support from the Government of Thailand, in particular the National Research Council of Thailand, even in face of the country's economic situation in the second half of the year.

Excellent support was also received from UNESCO office in Bangkok- PROAP, in both programme implementation and arrangements with respect to personnel, both of which are essential for the operation of the office in Bangkok.

5.3 IOC REGIONAL COMMITTEE FOR CO-OPERATIVE INVESTIGATION IN THE NORTH AND CENTRAL WESTERN INDIAN OCEAN (IOCINCWIO)

Reviewing the IOCINCWIO activities over the last two years, we can clearly observe a gradual shift from human capacity building activities such as workshops and training courses, towards operational activities in 1996 and 1997. This is partly due to the successful partnership between IOCINCWIO Member States, IOC, Belgium and Sweden (Sida/SAREC)of which the latter is providing continuous support for the implementation of activities in the region since 1990.

5.3.1 IOCINCWIO-IV

The IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean (IOCINCWIO) held its Fourth Session in Mombasa, Kenya, 6-10 May 1997.

The Fourth Session was attended by over 70 participants including representatives from Member States (Comores, France, Germany, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Tanzania), organizations and projects (Commission de l=Océan Indien, Commonwealth Science Council, UN-ECA, IGBP-LOICZ, KBP, UNEP, UNESCO, WIOMSA, WMO) and several observers.

During this Session a wide range of topics covering all aspects of marine sciences were discussed. The Regional Committee noted the wide range of activities and the implementation of the agreed programme of the Third Session of the Regional Committee (Mauritius, December 1992) which constituted an example of regional capacity building. The Regional Committee expressed appreciation to donors supporting the programme, in particular Sweden (Sida/SAREC). The Regional Committee adopted a comprehensive and detailed five year (1997-2001) work plan with a budget of approximately US$ 3,000,000. Recognizing that this exceeds the financial resources of the IOC, the Regional Committee invited Member States as well as other international organizations and donors to provide support for the implementation of the work plan.

5.3.2 Marine Pollution research and monitoring

Based on the recommendations made during IOCINCWIO-IV, four research institutions (from Kenya, Mauritius, Seychelles and Tanzania) initiated the gathering of data on water quality at three selected >base line= monitoring stations so as to establish the basis for a regular monitoring programme. Mid-term progress reports on the observations will be produced in August 1998 by the institutions concerned. Support is provided from the IOC.

In March 1997, IOC fielded an expert mission to Kenya, Tanzania, Madagascar, Mauritius and Seychelles. The purpose of the mission was to: i) assess the general state of coastal and marine pollution with respect to marine debris/solid waste in Western Indian Ocean countries; ii) identify national institutions and key individuals for the execution of an IOC marine debris/solid waste pilot project in East Africa; gather relevant basic data and documents relevant assessing the need for a first workshop on marine debris/solid waste management in the region. The mission was undertaken by the West Africa co-ordinator for marine debris monitoring. Based on the results, IOC will organize a Marine Debris Symposium in Zanzibar in February 1998. The aim of this exercise will be to establish a regional marine debris/waste management action plan for East Africa.

5.3.3 Coastal Erosion

The IOC Secretariat has received the Methodological Guidelines for the Assessment, Interpretation and Management of Coastal Changes in East Africa, which was prepared by two scientists from Kenya and Tanzania in consultation with experts from OSNLR. The draft is now to be tested by some participants in the regional programme. Subsequently a regional workshop will be organized with these participants, the authors and other experts and reviewers of the draft, to complete the draft methodology.

The Kenya Marine and Fisheries Research Institute (KMFRI) in Mombasa, Kenya with the support of IOC, is spearheading studies aimed at the characterization of the Kenyan shoreline as either stable areas or those vulnerable to coastal erosion. Kenyan scientist (KMFRI) and the Institute of Marine Sciences (University of Dar-es-Salaam), Zanzibar, Tanzania, have conducted surveys from 1996 on the extent and socio-economic impacts of coastal erosion in Kenya and Tanzania, respectively.

Subsequently a high-profile national seminar was organized in Kenya (23-25 June 1997). Representatives of the major interest groups were invited in order to review existing knowledge on the problem of coastal erosion, including the results of the above-mentioned surveys, and to consider appropriate actions by those concerned, including Government, with a view to mitigating these impacts. To create awareness among the local population, a public campaign was launched in cooperation with IOC, the Coastal and Small Islands Unit (CSI), the UNESCO Communication Sector and the Kenyan Ministry of Information and Broadcasting, on radio and television in Kenya and Tanzania. IOC supported this campaign by providing three video-films on coastal matters (including on coastal erosion in Kenya), broadcasted on national TV.

5.3.4 Critical Habitats

As reported in Section 1.2 OSLR, IOC together with UNEP-Water Branch organized a training course on satellite image interpretation of seagrass beds and related habitats (Zanzibar, 24-28 November 1997). Scientists from Kenya and Tanzania were trained. IOC and UNEP have decided to organize a similar event in 1998, focusing this time on Western Indian Ocean Island States.

Within the new framework of co-operation between IOC and the >Commission de l=Océan Indien= and in collaboration with the Seychelles Division of Environment a pilot project on sensibility mapping of shallow water areas of Mahé has been initiated. This project will contribute to the preparation of a sea use plan and a multi-user marine resources management plan through testing of a low cost methodology for sensibility and vulnerability assessment of nearshore and shallow water areas of Mahé. The sensibility mapping will also bring essential information for the sensibility assessment to oil spill pollution and it will complement the Seychelles Oil Spill Contigency Plan. Training of Seychellois counterparts in shallow water mapping and assessment was undertaken during the field work phase of the project. The Atlas resulting from this study will be published in March 1998. The project is supported by France and Sweden.

5.3.4 GOOS

IOC in co-operation with Geosciences Foundation (GOA), IUCN, IGBP, and Sweden (Sida/SAREC) organized a Workshop on Land-Ocean Interaction in the Coastal Zone (LOICZ) Related Partners in Marine Science Programmes of the Eastern African Region, Mombasa, 10-14 March 1997. The objectives of the workshop were to draft a five year Marine Science Plan for the Eastern Africa region. This plan will contribute to the Coastal Zone Module of the Global Ocean Observing System (GOOS) and the implementation of LOICZ activities in Africa. The plan is built on existing research programmes such as the Large Marine Ecosystem of the Somali Current in the region.

5.3.5 IODE

IOC in co-operation with the World Meteorological Organization organized the First Implementation Planning Meeting for the Western Indian Ocean Marine Applications Project (WIOMAP), Mauritius, 20-22 May 1997. The objectives of the meeting were to explore the interest in, and possibilities for, such a project in the eastern and southern African region, to eventually define a project outline and specific objectives, and to agree on procedures for its further development. It was emphasized that long-term specialized training capabilities in the region would be essential to the future of the project. Reference was made to the WMO/IOC project for a diploma course in marine meteorology and physical oceanography at RMTC Nairobi.

5.3.5.1 Data Exchange : ODINEA

During IOCINCWIO-IV the region endorsed the ODINEA project proposal and allocated substantial resources for its implementation between 1997 and 2001. The ODINEA network will: (i) provide a regional co-operative structure linking national oceanographic data centres (NODC); (ii) ensure data involvement of national institutions in the IODE programme; (iii) adhere to the IODE data management procedures and ensure the use of standard methods for data collection and storage in the region; (iv) ensure access of scientists in the region to datasets not located in the region; (v) develop and disseminate data products for the benefit of scientists and policy makers in the region; (vi) establish exchange of data and information with the WDCs Oceanography.

As a first step in the implementation of ODINEA a Regional Training Course on Ocean Data Management was held in Mombasa, Kenya between 1 and 11 December 1997. The Training Course was attended by 19 participants from Comores, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, South Africa and Tanzania.

IOC provided computer equipment for the Kenya National Oceanographic Data Centre (KeNODC) and support was provided to a KeNODC staff member for an internship at the US-NODC.

5.3.5.2 Marine Information Management : RECOSCIX-WIO

RECOSCIX-WIO received strong support during IOCINCWIO-IV which resulted in substantial allocations in the 1997-2001 budget to ensure the continuation of the RECOSCX-WIO services and products. In 1997 the IOC provided financial support to the Regional Dispatch Centre Mombasa as well as equipment. The IOC also continued support to the regional newsletter WINDOW financially as well as through printing and distribution at UNESCO Headquarters. Special support was provided to individual institutions for Internet access. (see also under section 2.2 Marine Information Management).

IOC has provided annual subscriptions to bibliographic databases (including ASFA) to University of Asmara (Eritrea), Moi University (Kenya), Centre de Recherches Océanographiques CNRO (Madagascar), Institut Halieutique et des Sciences Marines IHSM (Madagascar) and University of Dar Es Salaam (Tanzania).(see also under section 2.2 Marine Information Management).

Support was provided to the regional ASFA input centre (RECOSCIX-WIO) for participation in the 1997 ASFA Advisory Board, Poland and for participation in the IAMSLIC 97 Conference in Charleston, USA.

5.3.6 WIOMSA

During 1997, support was provided for the operational activities of the WIOMSA Secretariat in Zanzibar. The Secretariat set out to achieve more active exchange with and amongst WIOMSA members through regular communications and improved membership functions including streamlining processing of MARG applications. A membership database and the WIOMSA News brief were also launched at the end of 1996. This year, 9 long-term research grants (one year) were awarded to scientists from the region.

During the first week of May, and prior to IOCINCWIO-IV, WIOMSA organized three important activities in Mombasa, Kenya with the support of IOC.
These activities are:

- **The First WIOMSA Scientific Symposium** (2-3 May 1997), providing an opportunity for MARG (Marine Research Grants) grantees to present the result of their research projects. The Symposium highlighted a number of activities which WIOMSA could take leading role in facilitating their implementation. These include: i) the sharing of limited equipment and training facilities within the region; ii) analyses of successes and failure of major on-going and completed projects and programme; iii) undertake research on emerging issues such as aquaculture; iv) production of periodic reviews on the state of marine and coastal environment of the region.
- **The 4th Meeting of the Board of Trustees** (4 May 1997) which recommended that WIOMSA work plan should be guided by priorities set by its General Assembly, national priorities of the countries and regional subsidiary bodies such as IOCINCWIO.
- **The First WIOMSA General Assembly** (5 May 1997) which adopted the WIOMSA constitution and discussed the role of National Co-ordinators, the triennial Plan of Activities (1997-1999).

5.3.6.1 Marine Science Country Profiles (MSCP)

Within the framework of the IOC-WIOMSA co-operation and as a contribution to TEMA as well as the IODE and regional programmes, Marine Science Country Profiles have been prepared for the following countries: Kenya, Tanzania, Seychelles, Mozambique, Comoros, Mauritius and Madagascar. The profiles include:

(I) general information on each country (geographic framework, economy, demography, coastal resources utilization);
(ii) information on policies and institutional framework (national institutions concerned with marine sciences, national policy related to the marine environment such as legislation and conventions);
(iii) capabilities and needs for each institutions identified, organizational profiles and functionality at the national level, research facilities and projects, human resources description.

The MSCP is a tool designed to assist individuals, local and international organizations and governments, in making informed decisions regarding allocation of funds to marine sciences programmes, and identified activities to be undertaken. The Profiles will be published and circulated early 1998.

5.3.6.2 Travel grants

Thirteen individual travel grants were provided in 1997 (including five WIOMSA MARG III grants). Support was also provided to six students to attend the Postgraduate Course in Tropical Coast ecology, Management and Conservation (20 July-7 September 1997, Mombasa) organized by the University of Nairobi, the Kenya Marine and Fisheries Research Institute, and the Free University of Brussel.

5.4 IOC REGIONAL COMMITTEE FOR THE CENTRAL EASTERN OCEAN (IOCEA)

Following the Fourth Session of the Regional Committee, Las Palmas, May 1995, a number of activities were implemented. Specific programme elements are presented below. As requested by the 19th Session of the IOC Assembly in order to remedy lack of personnel at the Secretariat, two part time consultants were appointed in September 1997 to co-ordinate the IOCEA activities and facilitate the participation of the IOCEA region in the International Year of the Ocean and the Pan African Conference on Sustainable Integrated Coastal Management (PACSICOM, July 1998, Mozambique). The IOC Assembly approved the southward enlargement of the IOCEA to cover Namibia, and South Africa.

Marine Pollution

IOC is participating in the Marine Debris Pilot Monitoring Project for the Gulf of Guinea, where the GIPME programme is co-operating with the UNIDO, LME Gulf of Guinea project. The results were analysed and synthesized during the Third IOC-LME Marine Debris/Waste Management Workshop in Abidjan, December 9-11 1996. The meeting also decided upon the order of action to be taken based on the Marine Debris Action Plan elaborated during the First Marine Debris/Waste Management Workshop, convened in Lagos, Nigeria, December 15-17, 1994. The participating countries, Cameroon, Nigeria, Benin, Ghana, Togo and Côte d=Ivoire, are receiving contracts from the IOC for further monitoring and Synthesis. The Fourth IOC/UNIDO-GEF LME Marine Debris Workshop took place in Cotonou, Benin, 15-18 December 1997. During this meeting, several country presentations were produced, and the Lagos plan of action together with the recommendations from the third marine debris Workshop were reviewed. In particular, participants decided to integrate socio-economic indicators into the monitoring phase so as to measure and understand the impact of marine debris on local community activities. Five local and regional NGOs also took part in the meeting. The workshop recommended the establishment of a national committee in each participating countries, addressing marine debris and coastal waste management issues. These committees shall be composed of decision makers, scientists, socio-economists, NGOs, representatives from the industry and fishing sectors, port authorities.

IOC supported a study aiming at assessing debris management in ports as a first step towards the Regional Outreach Campaign as stipulated in the Marine Debris Action Plan. The study provided a regional overview on waste management in the ports of the following countries: Benin, Cameroun, Côte d=Ivoire, Ghana, Nigeria and Togo. Emphasis was given on existing legislation for the control of marine debris pollution from land-based sources, ship generated wastes, industrial wastes, fishing activities and human habitats along the coastline. The report was reviewed and adopted by the participants of the Fourth Marine Debris Workshop.

IOC participated in the Workshop on Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities in the West and Central African Region, Abidjan, Côte d=Ivoire, 25-28 November 1997.

Integrated Coastal Management

IOC provided support to eight scientists from West Africa to attend the International Training Workshop on ICM (Boston, 20-21 July 1997) and the Coastal Zone 97 Conference (Boston, 21-24 July 1997). Participants were given the opportunity to present their work during the special session on >Coastal erosion and flooding in the Western Africa - New Directions=. An *Ad hoc* meeting was also organized during the Conference, giving the opportunity to discuss IOC activities in the IOCEA region.

IODE

The Sixth Regional Workshop on the IODE Global Oceanographic Data Archaeology and Rescue Project (GODAR-VI) for the countries of West Africa, was held in Accra, Ghana, from 22 to 25 April 1997. The Workshop was attended by 50 representatives from Benin, Cameroon, Côte d=Ivoire, Ghana, Guinea, Senegal, Nigeria, France, UNIDO, NOAA, RECOSCIX-WIO, LOICZ Project. The objectives of the Workshop were to: i) identify data sets and data holders available in different countries, which are at risk of being lost because of media degradation; ii) formulate recommendations aimed at assisting Member States in rescuing data and identify efficient mechanisms to valorise such data; iii) facilitate co-operation between Member States of Western Africa in oceanographic data collection and management, through the adoption of the IODE principles and procedures for national, regional and international benefits and improvement of national infra-structure available for these purposes.

Angola and Southern Africa

An IOC Mission was undertaken to Angola in April 1997 subsequent to the establishment of the new government in Luanda. The purpose of this Mission was to assess the state of the Marine Science capability in Angola with respect to development and further regional and international cooperation. A Mission Report is available. Training and capacity building was considered a focal point for Angola to address its marine environmental problems and to participate in regional marine science programs. The participation of Angola in research and monitoring of the living marine resources in the Benguela Current System is considered important and has moreover relevance to the establishment of the Benguela GLOBEC-SPACC programme.

Angola is already participating in scientific cooperation with respect to training and capacity building within the region. In April and May 1997, the first training course within the BENEFIT Programme (BENguela Environment Fisheries Interaction & Training) took place in Swakopmund, Namibia. The Course: AGTZ/IOC Advanced Training Course in Marine Science@ had 15 students from Namibia, Angola and South Africa who received training in general

marine science focussing on modern aspect of physical, chemical and biological oceanography with special reference to upwelling systems. The course was carried out as lectures, laboratory work, ending with a cruise on the vessel, Petr Kottsov. The training course was supported by Germany through its GTZ and several marine institutes, along with support and participation from IOC.

The BENEFIT Programme was established jointly between Namibia, South Africa and Angola with support from The Southern African Development Community (SADC), Norway and Germany. The establishment of this regional training programme was based on recommendations from an IOC mission undertaken to the region in 1994. This programme is intended to be a 10 year research and training activity, which will be funded from a variety of local, regional and international research and development sources.

In order to promote south-south co-operation and to strengthen links between scientists in Brazil and Angola, two scientists from Luanda, Angola, attended the Workshop on Coastal Zone Studies in Selinas, Brazil, 7-12 December 1997.

Publications

Contractual arrangements were made with Benin for the publishing of the Proceedings of the First IOCEA Cruise Symposium. The Proceedings will be available in early 1998.

Support was provided to CERESCOR (Guinea) for the publication of a special bulletin on Coastal Environment.

Individuals from the region were invited to be part of the Editorial Committee for the production of the IOCEA Monograph. The Committee is composed of scientists from Nigeria, Guinea, Cote d=Ivoire, Ghana, Namibia, Morocco, and South Africa. A call for contributions was issued in the second half of 1997. The first volume is expected to be ready for publishing in May 1998.

IOCEA Cruise

Following the offer from Nigeria to provide a vessel for the Second IOCEA cruise, preliminary arrangements were made for the organization of the Cruise. This project is expected to provide an opportunity for capacity building with regard to the delimitation of the continental shelf. It will enhance capacity building of developing countries (Nigeria and other west African countries) in the context of Article 21 of UNCLOS on the delimitation of the continental shelves. Nations are expected to collect geological data on their continental shelf claims and submit to the Secretary-General of the UN techniques used for collecting such data can only be acquired through regional projects. Regional scientists will also gain knowledge on geophysical methods used for studying coastal and marine processes. This cruise is planned to coincide with EXPO=98 and the 1998 Year of the Ocean as an Nigerian and African contribution to the activities of the 1998 Year of the ocean.

In 1998, with the forthcoming support of the Flemish Community of Belgium, funds will be made available for the development of marine data and information management for the IOCEA region, and in particular for the launching of the RECOSCIX-CEA network.

In order to facilitate the preparation of regional inputs to PACSICOM, support will sought for the organization of a West Africa Workshop on Sustainable Management of Coastal and Marine Resources, to take place in April 1998.

5.5 IOCINDIO (IOC REGIONAL COMMITTEE FOR THE CENTRAL INDIAN OCEAN

Subsequent to the Second Session of the IOCINDIO held during 20-22 November 1996 at Goa, India, Dr. A.E. Muthunayagam, Chairman, IOCINDIO, convened a meeting of the Indian experts in June, 1997 to consider the follow up actions on the recommendations of IOCINDIO-II. The National Committee recommended setting up a Regional Sea level Network and circulated a proposal to all the member countries for their comments. The member countries are requested to participate in the network programme, indicate the number of tide gauge stations required and agree to maintain the system. Depending on the responses, the Chairman IOCINDIO, is proposing to seek financial assistance from donors for implementing the programme. Australia and UK have responded so far.

In consultation with the Vice-Chairperson of IOCINDIO and a few other countries during the meeting of the XIX Session of the IOC Assembly in July 1997, it has been proposed to hold five workshops on the following subjects:-

(I) Workshop on storm surge modeling - India

(ii) Workshop on modeling techniques for the prediction of oil spills - ROPME

(iii) Regional workshop on tide gauge data analysis - India

(iv) A sub-regional workshop on coral reef - Maldives

(v) A regional workshop on integrated coastal states including coastal marine pollution to be held in connection with the Third Session of IOCINDIO in Iran.

Workshop (I) will be held in India in July, 1998. Workshop (ii) will be held in Bahrain by ROPME in February 1998 co-sponsored by IOC. Workshop (iii) can be held only after making progress in the setting up of Sea Level Network. Workshop (iv) will be held in association with Coral Reef Initiative. Workshop (v) will be held in Islamic Republic of Iran in conjunction with IOCINDIO-III.

5.6 IOC SOUTHERN OCEAN COMMITTEE (IOCSOC)

Dr. M.Tilzer, Chairman of IOCSOC presented to the IOC Assembly in June 1997 a plan of specific activities of the Committee for the 1997-99 period. Proposed activities include: (i) establishing a Pilot Project on Marine Pollution Monitoring, and setting up baselines in selected areas within the framework of the HOTO module of GOOS and in cooperation with UNEP, COMNAP and CCAMLR; (ii) convening two international workshops: one on >large scale variability in the coupled sea-ice/ocean system and underlying circum-Antarctic mechanisms=, and one on >coastal Antarctic current and the Antarctic shelf-slope front=; (iii) increasing ocean observations from supply and tourist ships; and (iv) developing an international programme on ozone and ultraviolet radiation and their impacts on the biosphere.

5.7 SOUTH EAST PACIFIC

Regional meetings in which the IOC participated and had leadership role were carried out in the region, e.g. the XVI Session of the International Coordination Group for the Tsunami Warning System in the Pacific; the XII Meeting of the CPPS Scientific Committee for ERFEN and the Joint CPPS/IOC/WMO Regional Co-ordination Seminar for the South Eastern Pacific. Other activities concerned programs of the IOC as HAB and GOOS were also developed. Details are reported under the relevant sections. The feasibility studies and project proposals from the TEMA Workshop held in Concepción, Chile, April 1996, were finished and summarized for further negotiation with donors.

5.8 SOUTH WEST ATLANTIC

The IOC continue cooperating and supporting the Sub-Regional Program for the Upper South-West Atlantic Ocean (ASOS) established by Argentina, Brazil and Uruguay. Activities of several IOC programs as TEMA (TEMA Workshop on Oceanographic Systems of the South Western Atlantic, Brazil), OSLNR, HAB, GIPME and GOOS (e.g. PIRATA Project) were carried out during 1997. Details are presented here under the relevant sections.

5.9 MEDITERRANEAN SEA

During 26-29 November 1997, a GOOS Capacity Building Workshop was convened in Malta to develop awareness about GOOS in the Mediterranean region, including the intergovernmental structure of GOOS, its operating procedures, principles, future plans and benefits. Also, it was to explore cooperation in developing GOOS in the region. The needs, capability, requirements for observing systems and training, and general interest in GOOS was to be identified for each country. The results of the workshop far exceeded expectations. Tremendous progress was made in establishing regional cooperation in GOOS and the participants were very focused and worked hard. Excellent support was provided by the Malta government, particularly the Malta Council for Science and Technology. The Mediterranean Forecasting System should provide a good foundation for developing GOOS in the region.

The workshop was conducted by Dr. Jan Stel (Chairman of GOOS Capacity Building) and Mr. William Erb of the IOC Secretariat and it was jointly supported by the IOC and UNEP. The workshop included fourteen participants. Countries represented included Croatia, Cyprus, France Greece, Israel, Italy Lebanon, Malta, Morocco, Spain and Turkey. Representatives from EuroGOOS, Joint Research Center of EC and MAP-UNEP attended. The workshop essentially

launched a Mediterranean regional GOOS activity which will be known as MEDGOOS. A memorandum of understanding will be drafted and circulated by February 1998 for approval by interested countries/agencies. The MOU will be modelled on the EUROGOOS MOU, thus allowing for membership by interested agencies.

5.10 BLACK SEA

Regular contacts and communication between the IOC Black Sea Regional Committee (BSRC) and national co-ordinators of the Black Sea Regional Programme were established. The first steps of co-operation with the GEF-programme, the Black Sea Economic Co-operation (BSEC) and on-going regional programmes (NATO-TU, NATO-WAVES programme, COMsBLACK) were realised. Implementation of Pilot-Projects n° 1 and 2 (PP-1 & 2) started successfully. The first workshop on PP-2, which took place in May 1997, Istanbul, Turkey, approved the scientific programme for 1997-1998. The same will be done for PP-1 in the beginning of 1998. The International Conference ABlack Sea 1997" held in May 1997, Varna, Bulgaria, supported by the IOC Black Sea Regional Committee, has decided to declare 1998 the AYear of the Black Sea@. The Nineteenth Session of the IOC Assembly approved with satisfaction the BSRC Annual Report.

5.11 PERSIAN GULF, RED SEA AND GULF OF ADEN

5.11.1 Persian Gulf

ROPME Co-operation

In 1997, co-operation with ROPME was continued and expanded. The focus was on the creation of a modern marine data collection and management infrastructure in the area. In response to Recommendation IODE-XV.9 on the Development of the IODE Infrastructure in the ROPME and PERSGA regions, the IOC/ROPME mission was arranged in March 1997 to the countries of the ROPME region with the objective to make the feasibility study and formulate recommendations to be taken by Member States to establish effective ocean data and information collection and management infrastructures. The mission consisted of 4 experts and was funded jointly by ROPME and IOC. The result of the mission was a concise report which presented a detailed description of available facilities and identified actions necessary to be taken in each of the visited countries (Kuwait, Saudi Arabia, Qatar, Bahrain, United Arab Emirates and Oman) for developing a network of data collection and management centres which would be able to meet national and regional needs for data and information products. As a follow-up to the mission, a regional IOC/ROPME training course on oceanographic and information management was arranged in Tehran, Islamic Republic of Iran under the auspices of the Iranian National Centre for Oceanography. The Course was successfully implemented with the participation of experts from the countries of the Persian Gulf and those bordering the Caspian sea. Lecturers from the host country and advanced IODE centres took part in the Course. The Course report has been prepared and published by IOC in the Training Course report series.

In 1997, negotiations continued between ROPME and IOC on the organizations of a research cruise to the Persian Gulf and Arab Sea on board a Russian vessel. The programme has been finalized and the cruise is planned for the implementation in the Summer of 1998 as one dedicated to the IYO.

5.11.2 Red Sea and Gulf of Aden

Cooperation with regional organizations continued and the Workshop Report on Oceanographic Input to Integrated Coastal Zone Management held in Jeddah was published. Contacts were established with UNEP-PERSGA-GEF regional projects

5.12 CASPIAN SEA

No specific IOC projects exist in this region. The IOC Secretariat participated in the intersectorial working group on the Interdisciplinary Caspian Sea Programme, set up within UNESCO to implement the resolution submitted by Azerbaijan, Islamic Republic of Iran and Kazakhstan and adopted by the Twenty-eighth session of the General Conference. Its work was co-ordinated by the UNESCO Division of Water Sciences. The IOC also provides advice to UNESCO on the implementation of the UNDP-funded project on technical support to Iran for the assessment of negative impacts of the Caspian sea level rise. The IOC is maintaining contacts with the IAEA Caspian Sea Project aimed at understanding sea level fluctuations using nuclear techniques. IOC Resolution XIX-14 emphasized the need for IOC to strengthen its efforts in this region.

5.13 SOUTH PACIFIC

5.13.1 SOPAC (South Pacific Applied Geosciences Commission)

In July of this year Alfred Simpson, the Deputy Director of SOPAC attended the IOC Assembly. This was the first time that SOPAC has been officially represented at an executive body meeting of the IOC. Mr. Simpson addressed the Assembly expressing his pleasure at being able to participate and he described various SOPAC interests and programs. For many in the IOC this perspective was new and in some respects challenging. The South Pacific to some extent is a new area for IOC and the present dialogue presents an opportunity to work together in the development of marine science and related services in this vast region of the globe.

During the Assembly Mr. Simpson and the Executive Secretary of the IOC signed a Memorandum of Understanding which addresses cooperation in the area of marine science, sustainable development and capacity building. It notes our concurrence that GOOS is a high priority in the South Pacific and we agree to explore the establishment of long term monitoring and data management activities with the aim of setting up pilot projects. Specifically mentioned is the aim to conduct a GOOS capacity building workshop in the region, and also a Health of the Ocean workshop. SOPAC agreed to participate in the International Year of the Ocean and to coordinate such activities on behalf of the region. It appears that the GOOS capacity building workshop is on track and should be convened in early 1998.

In September, the SOPAC Annual Meeting was held in Nadi, Fiji. IOC was invited to attend the meeting which was divided into a scientific session identified as STAR (Science, Technology and Resources), a Technical Advisory Group and a Governing Council. Mr. William Erb presented briefings to STAR on the Global Ocean Observing System (GOOS) and the International Year of the Ocean (IYO). These issues were discussed in the Governing Council as well. A recommendation on each was approved. Specifically SOPAC has agreed to support various GOOS activities including the GOOS Capacity Building Workshop planned for early 1998. Also, it has agreed to undertake surveys of the South Pacific region that will enable development of GOOS. Information required as background includes evaluation of existing long term monitoring networks, human capacity to undertake GOOS related activities and identification of data and information management networks. The SOPAC secretariat has also agreed to identify one of their staff as a contact for GOOS.

5.13.2 Marine Benthic Habitats and Their Living Resources: Monitoring, Management and Application to Pacific Island Countries

IOC sponsored this conference in cooperation with France, IFREMER, ORSTOM, SOPAC. MR. Geoffrey Holland, Chairman of IOC, provided the keynote address and related the global and regional interests of IOC to the very similar interests of the South Pacific. Over 150 people participated in the conference held in Noumea, New Caledonia, with over 60 papers presented and 15 poster sessions. At least two participants from every South Pacific island country was invited.

5.13.3 South Pacific Regional Environmental Program (Sprep)

Cooperation between SPREP and the IOC has expanded during the past year. Mr. Tamarii Tutangata , the Director of SPREP, visited IOC headquarters to discuss modes of cooperation with the IOC Executive Secretary during the spring. Of high interest to SPREP is GOOS capacity building, Health of the Oceans, climate change issues and the conference on Marine Habitats in Noumea. Letters were subsequently exchanged between the two secretariats which reinforced the common interest in cooperation and a commitment was made to attend the meetings of both organizations, funding permitted.

Consistent with the interest in expanding cooperation, the IOC was invited to present the keynote address at the Third SPREP Meeting on Climate Change and Sea Level Rise in the Pacific (August 18-22, 1997). IOC joined the conference as a co-sponsor and Mr. William Erb presented the address. Also, a presentation was made to the conference on the International Year of the Ocean, which encouraged the region to undertake activities contributory to the IYO.

5.13.4 Pacific Congress on Marine Science and Technology (Pacon)

The IOC co-sponsored the PACON 97 Conference, which was held in Hong Kong during August 6-8, 1997. It took place at the Chinese University of Hong Kong where Dr. Hongmo Yan, Director of the State Oceanic Administration, China, welcomed everyone as did Professor Arthur K.C. Li , Vice Chancellor, The Chinese University. The conference included a broad spectrum of papers on marine science and was well attended. The IOC representative, William Erb, presented a paper on the International Year of the Ocean (IYO), which for most was their first exposure to the event.

PACON 98 will be held in Seoul, Korea, during June 16-20, 1998. IOC will once again be a co-sponsor and will be responsible for organizing a special session on the Global Ocean Observing System (GOOS). This will be an opportunity to highlight GOOS development in Asia and the Pacific, and to emphasize IYO events. PACON has agreed to support IYO and it will seek ways to commemorate and celebrate the event.

5.13.5 Why is IOC Working in the South Pacific?

Member states may wonder why IOC is making an effort to expand cooperation in the South Pacific. This is a good question in light of the limited resources available to the organization and the many demands for IOC services in other regions. The primary reason is that capacity building is very central to the core rationale of the IOC, which has a global responsibility in the area of marine science development. Representatives of South Pacific island countries usually do not attend our meetings mostly because funds are not available for this purpose. It is not because they are not interested in the oceans, dependent on it or affected by its impacts. The opposite is true. Participants at our Assembly this year had the opportunity and benefit of hearing Mr. Alfred Simpson, the Deputy Director of SOPAC, speak about the needs of the region and his vision of how the IOC and the region might cooperate in the future. Mr. Simpson opened many eyes concerning the South Pacific=s sophistication about the oceans. It is fortuitous for the region and IOC that at the annual SOPAC meeting in October 1997 Mr. Simpson was appointed SOPAC=s new director beginning early in 1998.

The IOC has been active in the South Pacific historically because of global programs like GLOSS, ITSU, IGOSS and coral reefs (ICRI/GCRMN). These have been managed by the WESTPAC secretariat in Bangkok very ably. It has become clear that the geographical expanse of the region and the cultural differences between Asia and the South Pacific preclude the successful management of the IOC=s South Pacific program by the WESTPAC Secretariat. If IOC is to engage in South Pacific programs, global and regional, it must establish a focus in the region. Presently, this is being done by direct interaction between the secretariat in Paris and the region. This is expensive and time consuming in terms of travel. The posting of an IOC staff person in the region should be considered as an effective means of managing this program. Collocation at an existing institute or regional organization would create the administration/logistic efficiencies required.

The South Pacific is now the center of global interest in terms of the generation of El Niño=s and their impacts and study. The TOGA array and now TAO, which is part of GOOS, is being expanded by the Triton array. Both SOPAC and SPREP are seeking ways to engage in global change issues and they are interacting with WMO, UNEP and others. CLIVAR,CLIPS and START are being introduced in the region and any one conference attracts representatives of these programs to explain their work and plans for the region. The IOC can greatly leverage its capability to implement its program in the region by cooperating with these organizations and programs. The UNESCO Focus on the Pacific, which was a special session of the General Conference this year and in which the IOC participated, confirms the importance of the South Pacific to our activities and programs.

Both SOPAC and SPREP have recognized the importance of participation in the Global Ocean Observing System (GOOS) and have pledged their willingness to commit their resources to GOOS development in the region. A GOOS system could not be complete without the South Pacific as contributors. It already has TAO and the Global Coral Reef Monitoring Network (GCRMN) and has expressed interest in the coastal and health of the ocean modules of GOOS. In various forums the participants are beginning to refer to the South Pacific GOOS or PACGOOS. Such an initiative could easily cooperate with the other GOOS initiatives in the nearby Asian region (NEARGOOS and a possible SEAGOOS).

Thus, IOC=s involvement in the South Pacific is consistent with the objectives of the organization and that of UNESCO=s. We are making do with what we have and we have been very successful at expanding our resources from private donors to support these activities.

During 26-29 November 1997 a GOOS capacity building workshop was convened in Malta.

Progress has been made in organizing the GOOS capacity building workshop for the South Pacific region during mid-February 1998. This workshop, similar to the others, will seek to identify capacity in the region for undertaking GOOS activities. A survey of various capacities within the region related to human resources, existing monitoring systems, infrastructure, data systems and user requirements is underway. A distraction to the actual planning of the workshop is the preoccupation of raising sufficient funds to ensure that people from the region are able to attend. This is particularly a problem in the Pacific where travel costs are the highest in the world.

Each region is characterized by different infrastructures, needs, requirements and environmental parameters. The approach to capacity building in the different regions will therefore vary. Certain materials for briefings and instruction can be used universally and the IOC is making an effort to standardize such materials. A regional GOOS program can thus vary dramatically from others even though there is much potential and value in learning from other regions. In selecting participants for workshops an effort has been made to involve people from other regions who have gone through the development process.

C. CO-OPERATION AND DEVELOPMENT

6. CO-OPERATION WITH OTHER ORGANIZATIONS OF THE UNITED NATIONS SYSTEM AND OTHER BODIES: ICSPRO, GESAMP, ICSU-SCOR, IUGG, IGU, SCOPE, IGBP; OTHER BODIES AND PROGRAMMES; REGIONAL COOPERATION

6.1 ICSPRO, GESAMP AND RELATED MATTERS

The inter-agency cooperation is proceeding satisfactorily. The IOC is a partner in many joint programmes, most notably the WCRP, GIPME (as the lead agency), GOOS (as the lead agency), GCOS, ASFA/ASFIS, Ocean Mapping, Global Coral Reef Monitoring Network (with UNEP, IUCN, ICRI), OSLR-HAB. This involves also agencies outside the UN system, including some regional organizations like ICES, CPPS, APEC. During 1997 there has been an increasing action in the Pacific in association with SOPAC and SPREP. The guiding frameworks for the programmatic developments and implementation are UNCLOS and UNCED Agenda 21. Within the context of the preparations for 1998 International Year of the Ocean, several joint actions have been agreed upon. These include the UN electronic Ocean Atlas; several symposia, on the basis of the joint programmes; public relations actions and the UN Pavilion at EXPO=98.

In support of the implementation of the Climate Agenda, the Inter-Agency Committee on the Coordination of the Climate Agenda (IACCA) has been formed with WMO as the lead agency and IOC as a member in its own right.

The co-sponsors of GOOS have met formally several times during 1997 in order to improve the efforts and coordination in support of the GOOS development. This has been a very positive step.

The co-sponsors of the three global observing systems (GCOS, GOOS and GTOS) have also formed an inter-agency coordination committee, under the leadership of UNEP as the leader of the Earth Watch, to ensure the adequate cross-relation and information exchange. This has led to the establishment of some joint substance committees. These also involve CEOS. This latter mechanism leads the efforts in favour of the establishment of a global observing system.

The further negotiations as regards the potential establishment of a Treaty on Intellectual Property in Respect to Databases, following the WIPO Diplomatic Conference, December 1996, are being closely followed through the direct participation of UNESCO and WMO.

The joint IOC-WMO study of the implications of a possible co-sponsorship by IOC of the WMO Commission on Marine Meteorology (CMM) is proceeding, with two consultants appointed by WMO and IOC. The study report is expected to be presented to the executive councils of the two organizations in 1998.

The IOC participates, as a co-sponsor, in the work of GESAMP, including the preparation of the third marine environment assessment report.

6.2 CO-OPERATION WITH ICSU, SCOR AND RELATED BODIES

Cooperation between ICSU and IOC covers a wide range of subjects within such programmes as WCRP, GOOS, GCOS and IGBP, as well as through direct cooperation between IOC and SCOR, including in relation to specific 1998 IYO actions; IOC and IUGG (IAPSO and IAMAP); IOC and IGU. Cooperation with SCOR also includes the IGBP core programmes - GLOBEC, JGOFS and LOICZ. During 1997 the remote sensing project on ocean colour has also become a joint activity with SCOR.

ICSU and SCOR, and possibly SCOPE, have also agreed to cooperate with IOC in the ocean science assessment project decided upon by the Assembly though Resolution XIX-17. This cooperation has been initiated.

6.3 CO-OPERATION WITH OTHER BODIES

Cooperation with ICES is continuing within the OSLR-HAB and GIPME programmes, as regards the scientific analysis and some training activities.

The mussel watch programme in WESTPAC is proceeding with UNU as the leading body, and some support from donors, particularly Sweden.

Cooperation with the EU occurs within IODE, in the Mediterranean programme and in networking developments in South America, with respect to TEMA and the coastal zone programme.

The IOC also cooperates in some aspects with ACOPS, in view of the supplementary nature of the organizations.

6.4 REGIONAL CO-OPERATION

The regional activities are increasing in importance. Hence the IOC is seeking to broaden and deepen cooperation and coordination at the regional level with the relevant regional bodies and counterparts. The interaction with the UNEP Regional Seas programme is increasing again, although more efforts are needed.

Interaction and exchange with other regional conventions and their secretariats, such as OSPARCOM and HELCOM, are maintained, and some specific joint activities are taking place.

In the Arctic basin interaction is sought with the Arctic Ocean Sciences Board and other programmes. A new development there is the regional bathymetry-mapping project as part of the Ocean Mapping programme.

The activities in the South Pacific have increased in 1997, and an active cooperation has been established with SPREP and SOPAC, as well as with the national institutions active in the region, such as ORSTOM.

7. FOLLOW-UP TO UNCED AND UNCLOS

7.1 FOLLOW-UP TO UNCED

All the IOC core programmes contribute to the follow-up to UNCED. New initiatives, such as the ocean science assessment work, are highly relevant to the implementation of UNCED decisions.

Coordination of cooperative inter-agency actions towards the implementation of UNCED and the related joint reporting are achieved through the ACC Sub-Committee on Oceans and Coastal Areas, reporting to the IACSD. Contributions to the report of the Secretary-General to the CSD are provided through the Sub-Committee.

UNCED follow-up has also stimulated a closer cooperation between the related UNESCO programmes - MAB, IHP, IGCP and MOST, and the IOC. A meeting of chairpersons was arranged in 1997 in conjunction with the 29th General Conference. It resulted in a joint statement highlighting the specific cooperation activities (see Annex 1). One of such areas concerns the coastal zones, where the Coastal Zones and Small Islands Project (CSI) acts as a catalyser.

The IOC also contributes directly to the implementation of the plan of action on SIDS from the Barbados Conference in May 1994.

IOC has indicated its willingness to implement, in cooperation with island states and with other UN and non-UN bodies, those aspects of the Barbados Action Programme which relate to Organization=s mandate.

A number of programmes of IOC are helping to elucidate the oceanic conditions facing islands and bring answers to some of the development problems involved.

All IOC programmes provide scientifically based information and data for decision-makers in island states and other regions and involve development of methods, manuals, assessment and capacity-building.

The IOC is addressing the basic scientific requirements for integrated coastal area management. This includes development of observation methods and related training and formulation of regional research and observation programmes, particularly through regional bodies (including in particular the IOC subsidiary bodies) and regional projects.

The coastal zone management is a major issue for SIDS and already at an early stage some specific activities were carried out as direct contributions to SIDS: a workshop on small island oceanography in relation to sustainable economic development and related coastal area management, was organized in the French Antilles in November 1993. Another contribution to SIDS was the AInternational Workshop on Geographic Information Systems (GIS) of Small Island Developing States@m sponsored by IOC and the Canadian Government which was held in Barbados, just prior to the UN Conference on SIDS which was held in April-May 1994 in Barbados.

The bulk of IOC=s activities with respect to SIDS assistance adopts a regional approach. In certain cases, however, IOC also provides technical assistance to individual SIDS nations, mostly in the field of Integrated Coastal Management.

In 1997, national assistance was provided to the Seychelles: the Mahe Mapping project (Seychelles) is supported by IOC and the Indian Ocean Commission. The main objective of this project is to contribute to the preparation of a sea use plan and a multi-user marine resources management plan through testing of a low cost methodology for sensibility and vulnerability assessment of nearshore and shallow water areas of Mahe. Expected benefits of this project are:

(i) testing a methodology for potential extension of other islands;

(ii) diminished user conflicts;

(iii) enhanced economic revenues from national management of the sea resources and sea space;

(iv) enhanced protection of the marine environment. The final product will be a Coastal Zone Atlas.

As a follow-up to the IOC Regional Workshop on Coastal Oceanography and Coastal Zone Management (December 1996, Moroni, Comores) which was specifically designed to address SIDS marine and environmental concerns, IOC will contribute to coastal zone cartography of SIDS in Western Indian Ocean, in cooperation with UNEP and the Indian Ocean Commission. The objective of this initiative is to facilitate the establishment of a regional Environmental Information System for SIDS, which will assist coastal managers and policy-makers in formulating sustainable plans of the coastal environment.

Looking at IOC interaction with SIDS, we can observe a gradual shift from human capacity building activities such as workshops and training courses between 1989 and 1995 towards operational activities in 1996 and 1997. This shows that regional scientists have reached maturity. Whereas efforts in the past were geared mainly towards education, we are now working mainly on operational activities. Gradually, monitoring networks are involving in the field of marine pollution, coastal processes, critical habitats (such as the Global Coral Reef Monitoring Network - GCRMN) Together with regional methodologies.

The IOC is also a partner in the implementation of the GPA-LBA adopted at the Washington DC Conference in November 1995 and following the related UN General Assembly Resolution A/51/189, December 1996. The IOC endeavours to involve the IOC regional subsidiary bodies/programmes in this implementation through participation in the related regional assessments and meetings organized by UNEP as the lead agency for the implementation. The ACC Sub-Committee on Oceans and Coastal Areas serves as the inter-agency steering mechanism.

ACC SUB-COMMITTEE ON OCEANS AND COASTAL AREAS
Lisbon, Portugal - 20-23 January 1998

SUMMARY REPORT

The ACC Subcommittee on Oceans and Coastal Areas held its sixth session at the Ministry of Foreign Affairs, Lisbon, Portugal from 20-23 January 1998, taking advantage of this opportunity to participate in launching of the 1998 International Year of the Ocean and to interface with national authorities, including those associated with >EXPO-98'.

In regard to development of the UN Ocean Atlas, the ACC Subcommittee agreed to the presentation of a prototype at EXPO=98 and at other relevant events as planned; confirmed its long-term commitment to the development of a fully-fledged Internet version of the UN Ocean Atlas; re-iterated its preparedness to consider co-operation in this task with Governments and the private sector; and agreed to further monitor the progress made by this joint project at its forthcoming sessions.

Recognizing the need for improved use of scientific data and information by decision- makers in various sectors of society, and taking El-Niño as an example, the Subcommittee agreed that a joint effort should be made to help remedy this situation, e.g. through a communication forwarded to the Inter-agency Task Force on El-Niño.

In regard to the 1998 International Year of the Ocean, the Subcommittee agreed to a set of principles to be used as the framework for an integrated report for assessing its impacts, both during the international year and as an impetus for future activities and policy formulation..

In considering a request from the UNEP Governing Council that it assume responsibilities as the Steering Committee for the Global Plan of Action for protection of the marine environment from land-based activities, the Subcommittee amended a draft document on its related role and functions and forwarded such to the Inter-agency Committee on Sustainable Development (IACSD) for its comment and advice. Due note was taken of the need to reinforce collaboration in this area with the ACC Subcommittee on Water Resources.

The Subcommittee noted that the first intergovernmental review of GPA implementation is planned for 2000. However, the meeting felt that it would be most useful if an *ad hoc* governmental consultation for preliminary review could be convened in conjunction with CSD-7, e.g., via an *ad hoc* inter-sessional working group.

Bearing in mind the 1999 work programme of the Commission on Sustainable Development and its focus on Oceans and Seas, and as Task Manager for Chapter 17, Agenda 21, the Subcommittee drew to the attention of the IACSD a number of proposals as found below.

In accordance with the guidelines used for CSD-6, the Subcommittee suggests that the basic report of the Secretary-General on Oceans and Seas should be supplemented by three addenda which might focus on: I) implementation of the GPA; ii) an overview of results of the 1998 International Year of the Ocean; iii) collaborative activities of the UN System.

The Subcommittee strongly urged that one of the CSD-7 *ad hoc* inter-sessional working groups be devoted to Oceans and Seas.

It was agreed that the next inter-sessional work plan of the Subcommittee and the draft agenda for its seventh session would include as priority items: UN Ocean Atlas; the 1998 International Year of the Ocean; review of implementation planning for the GPA; reporting to the CSD.

Taking into account its future workplan and the need for continuity in the 1998-99 period during preparation and presentation of the Report of the Secretary-General on Oceans and Seas, the Subcommittee also agreed: I) to hold its seventh session during the week of 25 January 1999 at IAEA Marine Environment Laboratory in Monaco; (ii) that the present Chair and Vice-Chair should continue their functions through 31 December 1999; and (iii) to forecast the need for an informal session, including a joint informal session with the ACC Subcommittee on Water Resources (tentatively planned for the month of August 1998 in the Hague, hosted by UNEP).

7.2 FOLLOW-UP TO UNCLOS

Actions have been pursued in 1997 to follow the proposals of the Intersessional Working Group on IOC=s Possible Role in Relation to the UN Convention on the Law of the Sea as endorsed by the 29th session of the IOC Executive Council.

A first " Draft IOC Principles on Transfer of Marine Technology" was prepared by the IOC Secretariat as a preliminary attempt to move towards establishing some guidelines on the transfer of marine technology within the framework of the IOC. These principles are presented in document IOC/INF-1054 which was sent to the IOC TEMA Group of Experts and Intersessional Working Group on UNCLOS for comments.

A first " Draft IOC Guidelines on the Implementation of Article 247 of UNCLOS@ was likewise prepared by the IOC Secretariat in consultation with Prof. Soons, the Chairman of the IOC Intersessional Working Group on UNCLOS. The document as presented in IOC/INF-1055 was sent to the members of the IOC Intersessional Working Group on UNCLOS for comments.

Further to the list of experts in marine scientific research drawn up in the light of Annex II of the Convention and submitted to the UN Secretary - General on 10 January 1995, an updated list composed of 59 members from 29 Member States (as of 10 February 1997) was prepared and sent to the UN Secretary -General. Through IOC Circular Letter No.1555 dated 16 September 1997, the IOC Member States who have not nominated their experts in accordance with Annex II of UNCLOS was once again urged to do so.

Following the instruction of the 29th session of the IOC Excutive Council, the Executive Secretary IOC sent a letter , on 6 November 1996, to Mr. Adam Kerr, Director of the International Hydrographic Bureau, accepting the invitation from the IHO to IOC to co-sponsor the joint Advisory Board on the Law of the Sea (ABLOS).

An agreement on the publication of the synthesis on science and technology associated with definition of the continental shelf was concluded with the Oxford University Press. A second session of the joint IOC-IHO Editorial Board for the preparation of the synthesis has been planned in January 1998.

Based on the recommendation of the 29th session of the IOC Executive Council, the 19th Session of IOC Assembly, Paris, 2-18 July 1997, considered and endorsed the Report of the Open-ended Intersessional Working Group on IOC=s Possible Role in Relation to the UN Convention on the Law of the Sea (Document IOC/INF-1035|).

In view of the complexity and sensitivity of the Law of the Sea issues and the need for advice from legal and marine science experts of Member States in the implementation of provisions of UNCLOS, the Assembly decided, through Resolution XIX- 19, to establish an advisory body of experts on the law of the sea (ABE-LOS), with no budgetary implications, to advise the IOC Governing Bodies and the Executive Secretary IOC on the Law of the Sea issues. The proposed topics on which the ABE-LOS may be requested to take actions during the intersessional period include, inter alia:

(i) analyze and revise the ADraft Principles on the Transfer of Marine Technology@, taking into account Part XIV of UNCLOS and drawing upon the experience of other international organizations, e.g. IMO;

(ii) revisit the ADraft Guidelines on the Application of Article 247 of UNCLOS@ with a view to achieving a more balanced text;

(iii) analyze areas where IOC has competence and promote establishment of guidelines of non-legally binding nature in the interest of the IOC Member States;

(iv) prepare a questionaire to assess cases of interest to IOC where large-scale international marine scientific research initiatives are hampered by legal and political obstacles; and

(v) prepare a detailed analysis of topics concerning the identification, markings and warning signals of oceanographic equipment and facilities that might hamper navigation, in cooperation and co-ordination with IMO.

In addition, the analysis of other articles, e.g. Article 251 concerning the establishment of criteria and guidelines to assist the States in ascertaining the nature and implications for marine scientific research was also proposed. As a follow-up to the Resolution XIX-19, IOC Circular Letter No.1555 was sent out on 16 September 1997, inviting nomination of experts from the Member States to serve as members of ABE-LOS.

IOC was invited by the United Nations to the meetings of the States Parties to participate in the Convention, including the one which elected the members of the Commission on the Limits of the Continental Shelf in March 1997 in New York,as well as meetings of the International Sea-Bed Authority. Contacts have been initiated with the International Sea-Bed Authority in order to stimulate a dialogue and initiate consideration of co-operation in marine scientific research.

Upon invitation of the United Nations, IOC also provided the following contribution to the Report of the UN Secretary-General on the Law of the Sea at the 52th Session of the UN General Assembly, and participated in the UN sponsored assessment of the impact of the entry into force of the Law of the Sea Convention, organized by it.

Contribution to the Report of the Secretary -General

In the light of Resolution XVIII-4 adopted by the 18th session of the IOC Assembly, an Intersessional Working Group on IOC's Possible Role in Relation to the UN Convention on the Law of the Sea was established and had its meeting in Paris, 13- 15 May 1996.

The Working Group examined all the UNCLOS provisions which may have explicit and implicit relevance to the IOC, and agreed on a table identifying IOC's role in relation to the Convention. The report of the Working Group, together with the table, was endorsed by the 29th session of the IOC Executive Council, 24 September - 3 October 1996.

The identified analysis of roles of the IOC under UNCLOS are the following:

(I) role and responsibilities which are explicitly mentioned in the Convention, e.g. IOC should, upon express request from the CLCS, assist the CLCS through exchange of scientific and technical information in accordance with Article 3(2) of the Annex II of the Convention; IOC shall draw up and maintain a list of experts in the field of marine research in accordance with 2(2) of Annex VIII of the Convention, who can serve as arbitrators in Special Arbitral Tribunal, or act as experts in compulsory procedures entailing decisions in light of Article 289 of the Law of the Sea Convention.

(ii) role of the IOC, as a competent international organization in the field of marine scientific research with respect to marine scientific research, development of marine science and technology, management and rational use of marine living and non-living resources and protection and preservation of the marine environment.

Concerning marine scientific research (Part XIII), IOC's role will mainly focus on the promotion and facilitation of marine scientific research through strengthening its scientific programmes and projects and publication and dissemination of marine scientific information and knowledge, as well as through the development and establishment of necessary guidelines, procedures and criteria, including, for example, clear procedures on the application of Article 247 of the Law of the Sea Convention within the framework of the IOC.

With regard to marine science and technology development and transfer (Part XIV), IOC will put more emphasis on the promotion of marine technology transfer through formulating relevant principles and guidelines on the transfer of marine technology and encouraging the establishment and strengthening of national and regional centres on marine science and technology transfer in IOC regional subsidiary bodies within the context of IOC TEMA programme, in addition to the already existing training and capacity building activities.

In the field of management and rational use of marine living and non-living resources, IOC , as a marine science organization, will not be engaged in the management itself, but will co-operate with other international organizations, e.g. the International Sea-Bed Authority, as well as regional organizations in managing the marine and non-living resources through providing scientific information, data and related interpretation as well as scientific advice.

It was emphasized that the existing marine science and services programmes, like GIPME, OSLR, OSNLR , IODE, Ocean mapping, and GOOS, are already contributing to the implementation of the Law of the Sea Convention and will continue to do so in accordance with IOC's mandate.

Over the past two years, based on the identified IOC's role and responsibilities and the instructions of the IOC governing bodies, a number of activities have taken place in the implementation of the Law of the Sea Convention.

Further to the list of experts in marine scientific research drawn up in the light of Annex II of the Convention and submitted to the UN Secretary - General on 10 January 1995, an updated list has been prepared and is presented in the Annex.

As a follow-up to the recommendation of the Meeting of the Group of Experts on Preparation for the Commission on the Limits of the Continental Shelf, September 1995 and confirmed by UN-DOALOS, the IOC and IHO have established a joint editorial board for further elaboration of science and technology associated with the definition of the continental shelf. At present, an agreement on the publication of the synthesis has been concluded with the Oxford University Press, and the final result will come out hopefully in late 1998. This synthesis may not only be useful for a scientific planning of coastal States' continental shelf and EEZ surveys and for the CLCS in its work, but may also serve as teaching material for future training courses on capacity building for developing countries wishing to plan their continental shelf and EEZ survey.

Following the instructions of the 29th session of the IOC Executive Council, a first "Draft IOC Principles on Transfer of Marine Technology" and a first " Draft IOC Guidelines on the Application of Article 247 of UNCLOS" have been prepared and submitted to the 19th session of the IOC Assembly, Paris, 2 - 17 July 1997, for consideration and guidance on further actions.

At the invitation of the International Hydrographic Bureau, IOC has co-sponsored the Advisory Board on the Law of the Sea (ABLOS), formerly co-sponsored by the International Hydrographic Organization (IHO) and the International Association on Geodesy (IAG) with UN-DOALOS as an ex-officio member. This will help strengthen the close co-operative relations between the organizations in the implementation of the Law of the Sea Convention.

In addition, IOC, in the light of the relevant provisions of the Law of the Sea Convention and IMO Resolution A.50 (III), has taken actions in urging IOC action addressees of the IOC Regional Committee on the Central Indian Ocean and Central western Indian Ocean, to use their channels to help publicize the information on deployment of oceanographic equipment in the international waters off Seychelles and in the international waters of the Indian Ocean, respectively from 9 - 26 January and from 16 June - 15 August 1996. This represents a new dimension of IOC actions in support of the implementation of the UNCLOS.

8. INTERNATIONAL YEAR OF THE OCEAN

To generate support for the International Year of the Ocean (IYO) the IOC secretariat decided to organize a gala event as part of the Earth Summit Plus Five Conference in New York during June 1997. Consultations were held with the UN/UNESCO New York Office and with the Director General to ensure there was support all-around for undertaking the event. In the United States the National Oceanic and Atmospheric Administration (NOAA) was contacted and they enthusiastically agreed to provide the NOAA research vessel RUDE for an open house. The ship would be moored near New York=s Water Club, a restaurant in the vicinity of the United Nations, and it would be used to display research equipment, thus giving delegates to the Earth Summit an appreciation for IOC=s activities and the role of member states.

To complete the event the Director General and the Executive Secretary IOC, co-hosted a reception at the Water Club on June 23, 1997, that was attended by over one hundred delegates and by members of the press and media. Various IOC posters and brochures adorned the Club and the vessel RUDE. Informational brochures and posters were also displayed at the United Nations. Speeches were made by Dr. Mayor, Dr. Kullenberg and Dr. Stan Wilson of NOAA. Delegates were presented with the plans for IYO and learned of IOC=s contributions to UNCED and about IOC program activities in general. Most participants who attended were from smaller countries and were particularly interested in our information concerning sustainable development and capacity building.

The officers and crew of the RUDE did a superb job in preparing the ship for the open house, providing tours and in arranging the posters. During the week school children from the surrounding area visited the ship along with delegates from the Summit and the general public. All agreed the IYO would provide an opportunity to greatly expand public awareness about the oceans (and IOC).

9. DEVELOPMENT OF IOC WITHIN UNESCO

The IOC development within UNESCO as an integral part of the Organization was debated at the 152nd session of the Executive Board of UNESCO. The debates highlighted the interest UNESCO has for the IOC, but also showed

the problems of understanding the situation such a specialized mechanism as IOC faces in the organization like UNESCO.

In parallel with these internal debates in UNESCO, the IOC has become more and more recognized outside UNESCO as an organization in its own right, dealing with the major ocean issues; although this recognition is not yet satisfactory in Member States. This certainly reflects the double nature of the IOC and the related weak national basis for the IOC, only a small part of UNESCO. National Commissions, or a weak national committee outside of the National Commission.

For the further strengthening of IOC this situation must be improved. The report presented to the 152nd Session of the Executive Board (Document 152 EX/12) received very mixed responses, which also highlights the difficult situation for IOC in UNESCO. The Board decided to request the Director-General to prepare another report on the IOC to be presented to its 154th session (April-May 1998).

The debate in the Commission III of the 29th General Conference gave a very strong support to the IOC and to the proposed programme for 1998 International Year of the Ocean. However, the proposed resolution on additional support to the IOC above that proposed by the DG was not endorsed; it was simply ignored. The Commission endorsed the continuation of the protected budget for the IOC. It also fully endorsed the Joint Statement

Following the advice and guidance provided by the IOC Executive Council at its Twenty-ninth Session on the progress report prepared by the DOSS-2 *ad hoc* Study Group (Document IOC/EC-XXIX/6), the Study Group met again in Southampton, UK, 13-17 January 1997 to prepare the DOSS-2 Interim Report (IOC/DOSS-2).

This Interim Report was considered by the IOC Assembly at its Nineteenth Session (2-18 July 1997). The recommendations contained in the Interim Report relating to administrative and management matters were all approved (Resolution XIX-15). The *ad hoc* Study Group was asked to continue its studies on the Statutes and Rules of Procedure, on all aspects having a bearing on geographic distribution, and on options for mobilization of support. The *ad hoc* Study Group was also asked to study the proposals presented in Annex 5, Document IOC-XIX/2 for achieving a consistent and harmonized evaluation procedure.

Following the Assembly=s consideration of its Interim Report, the *ad hoc* Study Group met in Paris, 20-22 October 1997. At that meeting it gave detailed consideration to a draft set of Statutes, and to options for mobilization of support. It also reviewed briefly a draft set of Rules of Procedure. As consequence, revised drafts of the Statutes and Rules of Procedure were prepared. These will be referred for expert legal advice, and considered at a further meeting of the *ad hoc* Study Group planned for March or April 1998.

The Resolution XIX-15 is being gradually implemented. The organizational structure of the Secretariat has been re-examined and the IOC Officers provided advice at their meeting in October 1997.

Monitoring of the programme implementation is continuous. However, a check list is being elaborated for testing during 1998.

The IOC Secretariat endeavours to follow the activities which may influence the future development of IOC, e.g. the IWCO and UN re-structuring and reform proposals, and will report to the Assembly.

10. PUBLICATIONS

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44 Design and Implementation of some Harmful Algal Monitoring System. 1996. (E)
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46 Equatorial Segment of the Mid-Atlantic Ridge. 1996. (E)
47 Peace in the Oceans; Ocean Governance and the Agenda Peace; The Proceedings of Pacem in Maribus XXIII. Costa Rica, 3-7 December 1995. 1997. (E)
48 Neotectonics and Fluid Flow through seafloor sediments in the Eastern Mediterranean and Black Seas. 1997. (E)
Part I: Eastern Mediterranean Sea

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105 Conference on Coastal Change, Bordeaux, France, 10-16 February 1995. Proceedings. -Supplement. (E)
122 IOC-EU-BSH-NOAA- (WDC-A) International Workshop on Oceanographic Biological and Chemical Data Management., Hamburg, Germany, 20-23 May 1996. (E)
123 Second IOC Regional Science Planning Workshop on Harmful Algal Blooms in South America. Mar del Plata, Argentina, 30 October - 1 November 1995. (E/S)
124 GLOBEC-IOC-SAHFOS-MBA Workshop on the Analysis of Time Series with Particular Reference to the Continuous Plankton Recorder Survey. Plymouth, United Kingdom, 4-7 May 1993. (E)
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130 Atelier régional de la COI sur l=océanographie côtière et la gestion de la zone côtière. Moroni, RFI des Comores, 16-19 décembre 1996. (F)
131 GOOS Coastal Module Planning Workshop Report, University of Miami, Miami, Fla., 24-28 February 1997. (E)
133 Joint IOC-CIESM Training Workshop on Sea-level Observations and Analysis for the Countries of the Mediterranean and Black Seas. Proudman Oceanographic Laboratory, Bidston Observatory, Birkenhead, Merseyside, United Kingdom, 19-27 June 1997. (E)
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41 IOC-Germany Advanced Training Course on Bathymetric Charting in the Western Indian Ocean On board R.V. Meteor between Durban and Cape Town, South Africa, 15-29 December 1995. (E)
42 COI-SHOA-CICESE Curso sobe Modelación Numérica de Tsunamis. Proyecto TIME. Valparaíso, Chile, 11 de Marzo-11 de Mayo de 1996. (S)
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3 IOC Annual Report. 1996. (EFSR)

IOC Informations (IOC/INF)

700 List of IOC Publications (as of June 1997). (E)
1044 A Strategic Plan for the Assessment and Prediction of the Health of the Ocean: A Module of the Global Ocean Observing System. Prepared by the Health of the Ocean Panel of the Joint Scientific and Technical Committee for the Global Ocean Observing System. May 1996. (E)
1045 Summaries of Contributions Presented at the Workshop on West African Fisheries Organized during the Advanced Course on Upwelling Systems (Atlantic Ocean Eastern Boundary). A Joint effort from IOC and the European Union Mast Programme. Las Palmas, Gran Canaria, Spain, 9-10 August 1995. (E)
1047 Brazilian Oceanographic Programme (NOP) Planned for 1997. January 1997. (E)
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1049 Cruise Reports of Australia for 1997, RV Franklin FR02/97, FR01/97. February 1997. (E)
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1053 Information and Guidelines for Participants in the Nineteenth Session of the Assembly. April 1997. (E)
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1076 National Oceanographic Programme of the Republic of Korea for 1997 (Planned). June 1997. (E)
1077 Australia: Cruise Plans - Tropics 97, R/V Franklin (FR/97 and FR04/97) and Cruise Summary R/V Franklin (FR03/97). June 97. (E)
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1080 Australia: Cruise Plan - Tropics97, R/V Franklin (FR07/97) and R/V Franklin Research Schedule and Projects for 1988. June 1997. (E)
1082 National Oceanographic Programmes - Argentina - 1997 (Planned) and 1996. July 1997. (E)
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32 Oceanographic Survey Techniques and Living Resources Assessment Methods. 1996. (E)
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114 Grupo Mixto de Trabajo COI-OMM-CPPS sobre las Investigaciones relativas a AEl Niño@. Octava Reunión, Concepción, Chile, 17-18 de abril de 1996. (S)
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116 GEBCO Officers Meeting. Tenth Session East-West Centre, Honolulu, Hawaii, USA, 3 May 1996 (E)
117 IOC Group of Experts on the Global Sea Level Observing System (GLOSS). Fifth Session. Pasadena, California USA, 19-21 March 1997. (E)

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70 Twenty-ninth Session of the Executive Council. Paris, 24 September-2 October 1996. (EFSR)
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73 IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean. Fourth Session, Mombasa, Kenya, 6-10 May 1997. (EF)
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61 The Contributions of Science to Integrated Coastal Management. Rome 1996 (E)
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