

**Intergovernmental Oceanographic Commission**  
*Reports of Governing and Major Subsidiary Bodies*

# **Twenty-fifth Session of the Executive Council**

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**UNESCO**

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## 1. OPENING

1 The Chairman, Prof. Manuel Murillo, opened the Twenty-fifth Session of the IOC Executive Council at 10:00 on 10 March 1992.

2 **The Executive Council received with interest** the statement given by the Chairman (see Annex III-A) and noted that the Director-General of UNESCO would address the Council in conjunction with the Roger Revelle Memorial Lecture.

3 The Chairman called on the participants to stand in silence as a mark of respect for distinguished individuals who had collaborated with the Commission and had passed away since the Sixteenth Session of the Assembly. Special reference was made to Borje Kullenberg (Sweden), Roger Revelle (USA) and Henry Stommel (USA).

4 The Chairman gave the floor to Dr. T. Kaasik, Minister of the Environment of Estonia, who made the following statement :

*"Mr. Chairman, Estonia is honoured to be accepted as a Member State of the IOC starting from this Session of the Executive Council. My country will actively participate in IOC meetings and programmes. My country, Estonia, is again independent and is responsible for its environmental health, including the Baltic Sea.*

*Estonia has learned with pleasure the increase of IOC interests and activities in regional programmes in coastal areas and in ocean and climate observing systems.*

*The Baltic Sea is one of the most studied but still little understood semi-enclosed water bodies. The changes in the Baltic Sea are evident and caused by nature and by man. Estonian oceanographers have, for many years, actively studied the Baltic Sea using the well equipped modern research vessel LIVONIA. The RV LIVONIA could be used as well in IOC studies and programmes.*

*Estonia is proposing to IOC to enlarge its interests in the Baltic Sea, in co-operation with other international organizations working in this area, especially with HELCOM and ICES. The IOC's outstanding experience in ocean studies will provide benefit to the Baltic Sea environment."*

## 2. ADMINISTRATIVE ARRANGEMENTS

### 2.1 ADOPTION OF THE AGENDA

5 **The Executive Council adopted** the Agenda as given in Annex I, noting that matters for general information would be discussed and reported upon under Agenda Item 3 and that only matters requiring the advice or decision of the Council had been included in the Agenda in accordance with Article 5.3 of the Statutes.

### 2.2 DESIGNATION OF THE RAPPORTEUR

6 **The Executive Council accepted** the proposal by Venezuela to designate Prof. Isabel Gurgel (Brazil) as Rapporteur for the Session.

### 2.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

7 The Secretary reviewed the arrangements for the Session and introduced a Provisional Timetable (Document IOC/EC-XXV/1 Add. prov. rev.1) and the Provisional List of Documents (Document IOC/EC-XXV/4 prov.).

8 The Secretary informed the Executive Council of the arrangements for the Roger Revelle Memorial Lecture. The Lecture, presented by Dr. J. Knauss, is given in Annex III-B.

9 In accordance with decisions of the Fifteenth Session of the Assembly, the Executive Council established a Technical Review Committee for Resolutions under the chairmanship of Prof. A. Metelnikov (Russian Federation), comprising Delegates of Algeria, Argentina, Brazil, China, Egypt, France, India, Kenya, Malaysia, Poland, United Kingdom and USA.

- 10 The Resolutions adopted by the Executive Council are given in Annex II. The List of Working Documents, the List of Participants and the List of Acronyms are given in Annexes V, VI and VII, respectively.

### 3. REPORT OF THE SECRETARY ON INTERSESSIONAL ACTIVITIES

- 11 The report on intersessional activities for 1991 (Document IOC/EC-XXV/6) was introduced by the Secretary who drew the attention of the Executive Council to programme matters and issues of particular importance. A summary of his statement is given in Annex III-C.

- 12 During the ensuing debate, numerous Delegates responded to the information provided by the Secretary and highlighted a number of pivotal issues which, in their views, should be borne in mind during consideration of the various Agenda Items. These include:

- (i) the need to mobilize greater resources for the IOC, especially to enhance its capacity to foster co-operation amongst Member States through activities at the regional level and related training, education and mutual assistance;
- (ii) continued development of the Global Ocean Observing System and its coastal components, with increased emphasis on providing advice and assistance to developing countries so that they can contribute to and benefit from this priority programme;
- (iii) reinforcement of the ocean partnership at all levels, but with particular emphasis on the strengthening of interagency relationships and links to international donor agencies and to the Commission of the European Communities;
- (iv) measures to increase public and political awareness of the role of IOC, bearing in mind that this is a shared responsibility of Member States and the Secretariat;
- (v) the chronic staff shortage in the IOC Secretariat and its impact on programme implementation, especially in regard to fluctuations in seconded staff, and delays in recruitment of staff positions committed by UNESCO.

- 13 The Executive Council endorsed the Report of the Secretary and expressed its appreciation for the work of the Secretariat.

**The Executive Council adopted Resolution EC-XXV-1.**

### 4. PROGRAMME AND BUDGET

#### 4.1 STATUS REPORT AND IMPLICATIONS OF THE UNESCO 26<sup>TH</sup> GENERAL CONFERENCE

- 14 The First Vice-Chairman presented this subject, drawing attention to trends of implementation during 1990-1991 and their implications to the programme of work and budget forecast for 1992-1993. In providing a detailed analysis of both sources of revenue and distribution of expenditure, he emphasized the need to balance available resources and requirements. Taking into account the recent downward adjustments made by UNESCO, in the order of 20%, he advised the Executive Council that his assessment indicated the Commission would need to reduce its minimal planning base by about 30%.

- 15 Noting that consideration of adjustments to the programme and budget would be taken under Agenda Item 12, he urged Delegates to assess carefully the financial implications of decisions to be taken during its present session so that a list of required adjustments could be decided upon. Given the fact that an adequate implementation rate across the whole spectrum of the IOC programmes requires at least a doubling of present resources, the First Vice-Chairman recognized that choices to be made by the Council would indeed be difficult. He therefore requested that Delegates also consider means by which the IOC could mobilize additional resources, not only from UNESCO but also through Member States and funding agencies.

- 16 The Executive Council took note with appreciation of the information and analysis provided by the First Vice-Chairman for further discussion under Agenda Item 12.

- 17       **The Executive Council also took note of the programme resolution on Major Programme Area II "Science for Progress and the Environment", adopted by the UNESCO General Conference at its 26th Session, by which the role of the IOC within a single unified marine science programme had been strongly endorsed, and urged an accelerated implementation.**

**4.2       POSSIBLE IOC ASSEMBLY SESSIONAL COMMITTEE TO DEAL WITH THE PROGRAMME AND BUDGET**

- 18       In introducing this Agenda Item, the Secretary recalled that the proposal to establish a sessional committee on the programme and budget had been made to the Assembly at its Sixteenth Session which had referred the matter to the Executive Council. He requested Delegates to refer to background provided in paragraphs 15-16 of the Action Paper (Document IOC/EC-XXV/8), and points he had raised therein regarding an alternative approach to assist the Commission in making periodic programme reviews and reaching agreement on priorities. Noting that this subject is being considered by the *ad hoc* Study Group on IOC Development, Operations, Structure and Statutes (DOSS), the Secretary suggested that any consultative meeting arranged during the present Executive Council should be viewed as an *ad hoc* Sessional Drafting Group to assist the First Vice-Chairman and not as a precedent that might prejudice the study being undertaken by the *ad hoc* Study Group on DOSS.

- 19       **The Executive Council concurred with the views of the Secretary and encouraged the *ad hoc* Study Group on DOSS to accord due importance to the need for procedures by which the Commission could undertake overall programme review on a periodic basis with the goal of providing guidelines to establish priorities that would be adjusted in light of changing circumstances and given time-frames.**

- 20       **Recalling that the IOC must be responsive to new developments as they arise, the Executive Council also requested the *ad hoc* Study Group on DOSS to bear in mind the need for flexibility in programme management under the direction of the Secretary in consultation with the Officers.**

- 21       **Reiterating the responsibility of the Executive Council, as a body of all Member States, to exercise a periodic programme review, the Executive Council instructed the *ad hoc* Study Group on DOSS to advise on appropriate procedures, including an *ad hoc* Sessional Drafting Group, which would facilitate consideration of matters concerning the programme and budget.**

**4.3       FOURTH UNESCO MEDIUM-TERM PLAN (1996-2001): PRELIMINARY CONSIDERATIONS**

- 22       The Secretary introduced this Agenda Item by referring to paragraphs 19-29 of the Action Paper (Document IOC/EC-XXV/8), emphasizing that an important stage in UNESCO's formulation of its Fourth Medium-Term Plan (1996-2001) would be an evaluation and review of the present plan (1990-1995). In so far as the IOC is concerned, this evaluation role should be exercised by the Commission's Governing Bodies.

- 23       **There is, therefore, a need to prepare and approve a status report on the period covered by the Third Medium-Term Plan, taking into account:**

- (i)       comparative state of the marine scientific, technological and infrastructure situation and related TEMA activities for training and mutual assistance, as reflected in the Third Medium-Term Plan and based on on-going activities;
- (ii)      analysis of the implications for the work of IOC of major events such as the United Nations Conference on Environment and Development (UNCED) and conventions or other legal instruments that may be agreed to or ratified, such as the UN Convention on the Law of the Sea and Framework Conventions on Climate Change and Biodiversity;
- (iii)     development of an IOC Action Plan as a means of achieving the goals set forth in 'The IOC: A Strategy for the Future' (Annex VII of Document SC/MD/97), based upon specific action plans that are or will be approved by each of the major IOC Subsidiary Bodies.

- 24       **The Executive Council instructed the Secretary to make arrangements for an expert consultation as soon as possible after UNCED with the terms of reference noted in para.20 above, using *inter alia* experts supported by IOC who are involved in the UNCED preparatory process, as well as other experts, and drawing on the advice of the *ad hoc* Study Group on DOSS, and of the Chairmen and Vice-Chairmen of IOC Subsidiary Bodies. The Executive Council further instructed the Secretary to solicit views from Member States and to present the results of the consultation to the Seventeenth Session of the IOC Assembly and, if approved, transmit them to the Director-General of UNESCO as an IOC contribution to the Fourth Medium-Term Plan.**

**5. PROGRAMME MATTERS REQUIRING DECISION BY THE EXECUTIVE COUNCIL.**

**5.1 OCEAN SCIENCE IN RELATION TO LIVING RESOURCES (OSLR)**

- 25 The Senior Assistant Secretary in charge of this Joint IOC-FAO Programme, Dr. Thomas Osborn, introduced the Item, referring to Documents IOC/EC-XXV/6, IOC Workshop Report No. 75 and IOC/INF-869.
- 26 The IREP-SARP Symposium, co-sponsored by the IOC and ICES, was convened during the 79th ICES Statutory Meeting, (La Rochelle, France, October 1991). An IREP-PREP meeting of the National Co-ordinators was held in conjunction with the IOC-WESTPAC Symposium in Penang, Malaysia, December 1991.
- 27 The Joint IOC-SCOR Workshop on Global Ocean Ecosystem Dynamics (GLOBEC) was held in Solomons, Maryland, USA, 29 April to 2 May 1991 (IOC Workshop Report No. 75). It recommended the establishment of an international programme on GLOBEC.
- "to understand the effects of physical processes on predator-prey interactions and population dynamics of zooplankton, and their relation to ocean ecosystems in the context of global climate systems and anthropogenic change."*
- 28 This recommendation was accepted by SCOR at its Executive Meeting (Hamilton, New Zealand, November 1991) and IOC was invited to jointly sponsor the related scientific steering committee.
- 29 The Executive Council accepted SCOR's invitation to co-sponsor and jointly organize an international programme on Global Ocean Ecosystem Dynamics Research and supported the establishment of a Joint Scientific Steering Committee.
- 30 The Joint IOC-SCOR Workshop also reviewed the Continuous Plankton Recorder (CPR) proposal for expanding its routes towards a more global coverage. The report states that:
- "Preservation of the continuity and integrity of the present dataset, as well as the development of substantially increased capabilities are crucial";*
- and
- "The workshop endorsed the belief that the present transition period for the CPR programme needs to be supported while a new system with enhanced capabilities is developed to provide a global ocean observing system for plankton for the next fifty years."*
- 31 The Joint IOC-SCOR Workshop on Programme Development for Harmful Algal Bloom Studies (Newport, USA, 2-3 November 1991) outlined the overall goals and objectives for the international community. As the organization responsible for the intergovernmental and scientific aspects, the IOC is required to provide guidance for the implementation of the programme. The IOC has responded by providing support for workshops, issuing a newsletter, and initiating preparations for a UNESCO manual on harmful algae and an international directory on the subject. SCOR has invited IOC to co-sponsor a Working Group on the Physiological Ecology of Harmful Algae.
- 32 The Executive Council decided to accept the SCOR invitation to co-sponsor the Working Group on the Physiological Ecology of Harmful Algal Blooms and ICES invitation to co-sponsor the Study Group on the Dynamics of Harmful Algal Blooms.
- 33 The *ad hoc* Intergovernmental Panel on Harmful Algal Blooms will be co-sponsored by FAO with no financial commitment at this stage. The Panel will meet 23-25 June 1992 in Paris.
- 34 The Iranian Delegation noted the needs in the ROPME area with respect to plankton identification and monitoring.
- 35 Several Delegations noted their continuing support for the programme.
- 36 Mr. R.R. Dickson described recent advancements in the Continuous Plankton Recorder Programme. During 1991, a route network of 15 time-series routes has been maintained, representing a total of 68,000 miles of continuous plankton sampling. Several countries and international bodies have supported the essential work of maintaining the time-series routes of the North Atlantic, which are now up to 60 years in



duration and offer a unique baseline for recognizing global change. The proposal to set up a truly global network of routes is tailored to meet the perceived problems of global change that we expect in each ocean region. Document IOC/INF-869 presents "The Role of the CPR in Global Ecosystem Studies" - including the scientific justification and the cost. The Fifth Session of the IOC Committee on Ocean Processes and Climate (Paris, 4-7 March 1992) recommended the Global CPR Plan as a practical, feasible and necessary component of the Global Ocean Observing System.

37       **The Executive Council noted the great progress made in preserving and expanding the financial support base, and further developing the Continuous Plankton Recorder (CPR) Programme, recalled the decision of the Twenty-third Executive Council to support the continuation and expansion of the CPR programme, and committed the IOC to continue to support the Continuous Plankton Recorder and to strive towards strengthening its financial base and to expanding its network of routes to a more global coverage by continuing the interaction with OSLR and, specifically, the GLOBEC initiative.**

38       Several Delegates noted with concern the lack of permanent staff support for the OSLR Programme and indicated that UNESCO should be encouraged to provide a full-time staff member for this core programme.

39       The United States indicated that it will consider providing a replacement for the seconded staff member for OSLR.

40       Concern for the shortage of resources for OSLR was expressed and the very limited financial participation by FAO was noted. **The Executive Council recommended that the Secretary and the Chairman initiate negotiations with FAO so as to achieve a more balanced approach and an effective involvement of FAO.**

41       UNEP indicated its interest in supporting programme developments in OSLR and specifically Harmful Algal Blooms.

42       The Delegate of Brazil informed the Executive Council of the well-developed co-operation between his country and Germany, that could serve as an example to be followed in inciting other Member States of IOC to use research vessels to develop joint research activities under the OSLR Programme.

43       The Delegate of Venezuela informed the Executive Council of the organization of a Workshop on Red Tides and Mortality of Marine Organisms (Caracas, Venezuela, 16-19 September 1992), and invited IOC to co-sponsor and support this Workshop through IOCARIBE as a contribution to the regional activities.

44       **The General Secretary of the International Council for the Exploration of the Sea (ICES) reported his organization's interest in GLOBEC, the Ecosystem Dynamics initiative of IOC and SCOR, and suggested that sponsorship by ICES could also be appropriate. In the area of Harmful Algal Blooms and phytoplankton productivity, there was a great mutual interest and on-going beneficial co-operation. ICES will attend the *ad hoc* Intergovernmental Panel on Harmful Algal Blooms and the General Secretary noted with interest the statement of the Delegate of Denmark concerning the willingness of Danish scientists to have the secretariat for that programme located in Denmark with Danish and/or Nordic support.**

45       Some Delegates expressed the view that the secretariat for the programme should be co-located with the other IOC programme components in the IOC Secretariat in light of the need to ensure harmonization, co-ordination and exchange of information.

46       **The Executive Council noted the expression of interest of ICES in actively participating in the programme and instructed the Secretary IOC to initiate discussions with SCOR and ICES concerning the expansion of the sponsorship.**

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

47       The Chairman of the IOC-UN(OALOS) Guiding Group of Experts for OSNLR, Prof. M. Vigneaux, introduced this Item, referring to the results of the *ad hoc* consultation on the Programme (Document IOC/INF-871) (Paris, 5-7 February 1992). He underlined that one purpose of the consultation had been to respond to the request of the Assembly at its Sixteenth Session (SC/MD/97, para.85) to the Chairman of OSNLR to provide to the Twenty-Fifth Session of the Executive Council, a detailed plan for the preparation of the Conference on "Coastal Change : Past, Present and Future -Its Scientific Appraisal for Effective Coastal Management". The Group had drafted such a plan of action (Annex V, Document IOC/INF-871).

and had also suggested that advantage be taken of the opportunity offered by the International Symposium and the associated Marine Exhibition (BORDOMER) (Bordeaux, France, September-October 1992), to consolidate the preparation of the Conference, taking into account the results of the United Nations Conference on Environment and Development (Rio de Janeiro, Brazil, June 1992).

48 The *ad hoc* consultation also considered possible ways and means for IOC to act as a mechanism to facilitate the involvement of Member States, in particular the developing ones, in the international Ocean Drilling Programme (ODP).

49 In conclusion, the Chairman GGE-OSNLR expressed the wish to concentrate on the TEMA Programme, following his election as Chairman of the Committee for TEMA at its Fifth Session (Paris, March 1991). He informed the Executive Council that, with the agreement of the Group, the Vice-Chairman, Dr. P.S. Cook, would act as an Interim Chairman until the next Session of the Guiding Group of Experts.

50 Many Delegates intervened to congratulate and to thank the Chairman GGE-OSNLR for his efficient handling of the development of the Programme.

51 The proposed plan of implementation presented by the Chairman GGE-OSNLR was accepted by the Executive Council. Many Delegates expressed the view that the proposed priorities attributed to coastal projects are adequate and, specifically, that implementation of these projects through regional activities should be supported.

52 The Executive Council expressed the view that, in pursuance of a recommendation made by the General Conference of UNESCO, it was essential that COMAR/COSALC be developed jointly with OSNLR. A contribution from COMAR to OSNLR has been suggested for South America and Western Africa particularly.

53 Some Delegates also stressed the importance of a close linkage of scientific research with economic aspects.

54 Many Delegates stressed the timeliness of the proposed International Conference on Coastal Change to be organized by IOC in 1994 and some Delegates strongly urged that plans for the Conference proceed without delay.

55 The Delegate of France expressed his country's willingness to continue the support given by France to OSNLR since the beginning of the programme. The coastal zone appears to be of particular interest and France approves the organization of a conference on coastal change. The Delegate of France also informed the Executive Council that the International Symposium and associated Marine Exhibition in Bordeaux (BORDOMER), in September-October 1992, would offer a good opportunity to study the outcome of UNCED relevant to OSNLR and to prepare the proposed international conference to be held in 1994.

56 Referring to observations as to the possible place of the Conference, some Delegates expressed their preference for the Southeast Asian region and others for the Caribbean region. A tentative proposal was made by Indonesia. The Observer of Cuba reminded the Executive Council that, at the Sixteenth Session of the Assembly, his country had strongly supported holding such a conference and had expressed the wish to host the conference in 1993 at the Third Congress of Marine Science being organized by Cuba.

57 Many Delegates welcomed the steps initiated by the Secretariat concerning the proposed Plan of Action to facilitate the participation of scientists from IOC Member States, and, in particular of developing countries, in the Ocean Drilling Programme (ODP). They stressed the broad interest shown by scientists to be involved in the Programme as well as the need for IOC assistance in this field. It was pointed out that the special Symposium on Current Progress in ODP Research, to be held in conjunction with the IOC-sponsored Twenty-sixth International Geological Congress (Kyoto, Japan, 24 August - 3 September 1992), offers an opportunity for scientists from developing Member States to improve their understanding of recent ODP research.

58 The Delegate of Malaysia informed the Executive Council of the completion of the IOC Advanced Training Course on Nearshore Sedimentation and the Evolution of Coastal Environment (Kuala Lumpur, 17-29 February 1992) which had been attended by 15 trainees and 5 lecturers. The course received financial and technical assistance from the German Government and the Malaysian Hydrographic Department arranged a one-day demonstration cruise and two field surveys in addition to classroom lectures and laboratory training.

59       The Delegate of Brazil informed the Executive Council of the importance attached by Brazil to the OSNLR programme, and to the two regional OSNLR-related courses planned for this year: "Remote Sensing Applied to Oceanography" (in co-operation with IOC-COMAR/COSALC) (July 1992) and "Gravitational Fluxes and Their Importance on Marine Geology" (November 1992).

60       Some Delegates expressed the opinion that the training component was a key element in bridging the gaps in scientific knowledge between developing and industrialized Member States, and in encouraging scientists from developing Member States to become involved in on-going IOC programmes.

61       The Delegate of Japan, in announcing that the Second Asian Geological Conference to be held in Tokyo in August 1992, expressed the hope that IOC would provide some assistance towards participation of geologists from the region. He also informed the Executive Council that an oceanographic cruise on marine geology/geophysics is planned in the western Pacific in 1993, and invited IOC to use this possibility for training activities.

62       The Delegate of Russia informed the Executive Council of the plan to hold a scientific seminar on the subject of ecologically safe management of exploration and exploitation of marine non-living resources during a cruise by a Russian vessel in the Mediterranean Sea in 1992, and proposed that IOC use this occasion for relevant training.

63       The Executive Council accepted the Summary Report of the *ad hoc* Expert Consultation on OSNLR (Document IOC/INF-871) and endorsed the proposed priorities and budget for 1992-1993. The Executive Council instructed the Secretary IOC to endeavor to meet the requested budget. The Executive Council acknowledged that the proposal, entitled "Low Cost Indigenous Technologies for Coastal Erosion Control in the West and Central African Region", would assist further development of the on-going OSNLR project in the region and expressed its support.

64       The Executive Council endorsed the plan proposed by the expert consultation for the organization of an International Conference on Coastal Change in 1994, and instructed the Secretary IOC to arrange a preparatory meeting on the occasion of the Marine Exhibition (Bordeaux, October 1992).

65       The Executive Council recognized the increased interest in ODP shown by scientists from Member States, and particularly those from developing countries, and endorsed the Plan of Action proposed by the Group of Experts. It instructed the Secretary IOC to identify action priorities according to the availability of funds and to provide assistance to selected scientists from developing Member States of IOC, to participate in the ODP Session to be held in Kyoto in August 1992.

66       The Executive Council noted with satisfaction that the training course in Kuala Lumpur, had been successfully carried out, and expressed its thanks to the Governments of Germany and Malaysia for their assistance. It instructed the Secretary IOC to increase training opportunities and to provide support to the Second Asian Geological Conference.

### 5.3   GLOBAL INVESTIGATION OF POLLUTION IN THE MARINE ENVIRONMENT (GIPME)

67       In introducing this Agenda Item, the Chairman of the IOC Committee for GIPME, Dr. Neil Andersen, referred to Documents IOC/EC-XXV/6, IOC/EC-XXV/8 and the Executive Summary of the First Session of the Joint IOC-UNEP Intergovernmental Panel on GIPME (Document IOC-UNEP/IGP-GIPME-I/3S).

68       He informed the Executive Council that a meeting of GIPME officers in September 1991 reviewed on-going activities, and refined the Second GIPME Action Plan adopted by the Sixteenth Session of the IOC Assembly. Particular attention has been given to MARPOLMON with a view to identifying the marine pollution problems facing individual regions and the needs and means to solve them. With the establishment of the Joint IOC-UNEP Intergovernmental Panel on GIPME, this review will also cover UNEP's Regional Seas Programme Areas.

69       Dr. Andersen pointed out that the work of the GIPME Groups of Experts (GEMSI, GEEP and GESREM) remains the central thrust of the GIPME Programme.

70       GEMSI's efforts on methods development, intercomparison exercises and training are all designed to address the fluxes of contaminants both at the land/sea and atmosphere/sea boundaries, as well as in the water column and sediments from the perspective of mass balances. GEMSI also continues to play a role in quality assurance/quality control development at the global and regional levels.

- 71 The first track of the Open Ocean Baseline Study in the South Atlantic on Germany's RV METEOR has been concluded and a second track is to be conducted in mid-1993 in the northwest Atlantic Ocean on board Canada's RV HUDSON. Dr. Andersen appealed to Member States for the provision of such platforms for future undertakings.
- 72 GEEP continues to work on methods for evaluating the biological effects of pollution and will be considering the effects of biological impacts on the role of biota in biogeochemical processes in coastal seas. It is also developing the means to establish indices of biodiversity in marine communities.
- 73 GESREM is focussing on the production of two standard reference materials based on mussel tissue with the first being certified for a number of trace metals and the second for organic analyses including the organochlorines pesticides and chlorobiphenyls that are of concern in the International Musselwatch Project. GESREM will also propose a plain language workbook on the proper use of reference materials.
- 74 The three Groups of Experts have had the opportunity to provide comments with regard to the developments of the Global Ocean Observing System (GOOS) and would continue to work towards the provision of a credible module of GOOS on the Health of the Oceans.
- 75 Dr. Andersen stated that the first phase of the International Musselwatch Project being implemented in the Americas is about half way through the collection stage. Planning for the next phase will be directed towards Africa and the South-east Asia region to close the Pacific rim.
- 76 On the war-related environmental degradation in the Persian Gulf, he said the formulation of the Integrated Project Plan (IPP) by IOC in collaboration with ROPME was a remarkable achievement within the context of the GIPME Programme. He referred to the on-going IOC-ROPME-NOAA cruise, and called for the speedy implementation, as well as an extension of the life span of the IPP beyond the proposed initial two years.
- 77 Dr. Andersen regretted that progress in the implementation of certain decisions taken on the Black Sea by the Sixteenth Session of the IOC Assembly was insufficient due to the political situation which had prevented the timely signing of the Convention for the Protection of the Black Sea Environment against Pollution, and the development of a concise plan of action.
- 78 GIPME had been active in working with SCOR in regard to implementing the JGOFS Arabian Sea Process Study scheduled for 1994.
- 79 He expressed satisfaction over the outcome of the recently concluded First Session of the Joint IOC-UNEP Intergovernmental Panel on GIPME (Document IOC-UNEP/IGP-GIPME-1/3S), noting that the main objective of this Panel was to promote overall co-ordination, provide guidance and harmonize the implementation of the scientific and management components of the activities of the IOC and the UNEP Regional Seas Programme with a view to optimizing the use of available resources. He also informed the Executive Council that the Panel had elected Dr. Mario Ruivo as Chairman, Prof. Yussuf Halim and Dr. Hassan Mohammadi as Vice-Chairmen, and Dr. M. Bewers as the GIPME liaison officer for the intersessional period and the next Session.
- 80 Finally, Dr. Andersen stated that GIPME will continue to strive to meet the TEMA needs of Member States, and particularly those of developing countries.
- 81 The Executive Council expressed its satisfaction with the positive achievements under the GIPME programme in general. It noted the progress made in the implementation of the Second GIPME Action Plan (1991-1993) and especially the effort put into the review of the MARPOLMON aimed at adequately addressing specific regional needs.
- 82 The Executive Council welcomed the formalization of the IOC-UNEP Intergovernmental Panel on GIPME through the successful organization of the First Session in Paris (4-7 March 1992). It approved the report of the Session.
- 83 The Executive Council took note of the activities being executed under the Integrated Project Plan for the coastal and marine component of the ROPME region and in particular the on-going communal cruise in the Persian Gulf on board NOAA's RV MOUNT MITCHELL, decided to extend the plan beyond two years and recommended to ROPME to do the same so as to be better able to address the longer term assessment of environmental damage and the future restoration and rehabilitation efforts.

- 84 The Delegations of Ukraine and Bulgaria stressed the need for IOC to continue to pursue the implementation of Resolutions EC-XXIII.4 and XVI-7 on the Black Sea Project, noting that it would be only a matter of time before the political and legal arrangements needed to give the required impetus were put into place. They indicated that this was likely before the end of 1992. The Executive Council urged the Secretary to continue his efforts in this regard.
- 85 The Executive Council recognized the important initiatives taken by scientists from Turkey, Ukraine, Russia, Bulgaria and Romania, as well as the USA and Germany that had resulted in the development of the scientific research programme called the "Co-operative Marine Science Programme for the Black Sea (CMSPBS)". It noted the strong need for CMSPBS as a tool in the effort aimed at the preservation, protection and optimum utilization of the marine environment of the Black Sea and instructed the Secretary to take the necessary action towards a formal sponsorship of the programme. Steps in this direction were initiated during the Session of the Executive Council through an *ad hoc* expert consultation on the marine research and systematic observations in the Black Sea.
- 86 The Executive Council also noted the existing, if rudimentary, links between GIPME and the Joint Russian-American Project BERPAC and urged a strengthening of this collaboration in furtherance of GIPME's philosophy of emphasizing regional/national projects. Deriving from this, the Executive Council welcomed the Russian Federation invitation to IOC for GIPME involvement in executing the project "Ecological Monitoring of the Russian Seas" with a view to its possible adoption as a regional project at a later stage.
- 87 The Delegate of the Islamic Republic of Iran expressed gratitude to the Secretary IOC for assistance in setting up the National Centre on Oceanography in Iran and re-affirmed the readiness of Iran to host an international conference on the oceanography and marine ecology of the Persian Gulf as contained in Resolution 1 of the recently concluded First Session of the Joint IOC-UNEP/GIPME Panel.
- 88 The Delegate of Kenya made special reference to the increasing impact of IOC-SAREC training activities in building-up the necessary capability for sustainable development within the East Africa Region. He referred to the recent installation of some critical equipment at the Kenya Marine and Fisheries Institute and thanked IOC for facilitating the process.
- 89 The Delegate of Malaysia informed the Executive Council that Malaysia is presently the Chairman of the ASEAN Committee on Science and Technology (COST) and the ASEAN Senior Environment Officers (ASOEM) Meeting, as well as the co-ordinator of the IUCN/GEF project on mapping marine areas for the conservation of biodiversity in East Asian seas. His country would be ready to act as a conduit for IOC/GIPME to establish interaction with and a network of marine pollution monitoring and control programmes of these various bodies, and to promote increased co-operation with the East Asian Seas Action Plan of the UNEP Regional Seas Programme, with which Malaysia is already associated.
- 90 The Delegate of Canada expressed the wish to see GEMSI and GESREM merged into one Expert Group and re-affirmed his country's support for the Second Track of the Open-Ocean Baseline Study. He voiced concern as to the continued existence of the IOC Committee for GIPME beyond the establishment of the Joint IOC-UNEP Intergovernmental Panel for GIPME, wondering if it was not a potential recipe for confusion and/or duplication of roles. The Secretary IOC explained that, whereas integration of the two organs of GIPME is an ultimate objective, there is a need for a transitional period.
- 91 The Delegate of Portugal, in his capacity as the Chairman of the Joint IOC-UNEP Intergovernmental Panel on GIPME, stressed the need for closer co-operation between GIPME and relevant existing structures within the Commission of the European Communities noting the additional resources and benefits at the programmatic level that could accrue from such co-operation. He noted that certain potential roles of the Panel would be better identified and pursued post UNCED.
- 92 The Delegate of Germany emphasized the need for closer collaboration with ICES, while the ICES representative informed the Executive Council that co-operation between IOC/GIPME and ICES is very good.
- 93 The Representative of UNEP drew attention to the opportunities afforded by the joint sponsorship of GIPME by his Organization, and pledged its commitment to consolidate and expand this arrangement.

- 94           The Representative of the Organization of African Unity (OAU) noted that the programmes embodied in GIPME were similar to those of the Science and Technology Research Commission of the OAU and informed the Executive Council of the desire of his organization to benefit from the scientific and technical experience available under GIPME.
- 95           **The Executive Council adopted Resolution EC-XXV.2**
- 5.4       OCEAN DYNAMICS AND CLIMATE (ODC)
- 96           The Chairman of the IOC Committee on Ocean Processes and Climate, Dr. D.J.Baker, presented on his own behalf and on behalf of the Vice Chairman Dr. M. Ruivo, the executive summary and recommendations of the Fifth Session of the Committee (Paris, 5-7 March 1992) (Document IOC/OPC-V/3S).
- 97           The meeting was attended by Representatives of 27 Member States and 8 organizations.
- 98           The Committee reviewed existing research programmes related to climate (TOGA, WOCE, JGOFS), existing international ocean observing system arrangements and satellite observations (as presented in the GOOS Status Report for 1992) and national programmes related to GOOS. Seventeen Member States presented reports on national activities.
- 99           The Committee then considered planned activities and programmes, particularly the WMO-IOC-ICSU Global Climate Observing System (GCOS), the IGBP proposed project on Land-Ocean Interaction in the Coastal Zone (LOICZ), Pilot Activities of a UNEP-IOC-WMO Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change; Programme on the Coastal Ocean Advanced Science and Technology Study (COASTS); proposal on Continuous Plankton Recorder Survey, and Large Marine Ecosystems; proposed activities on the application of marine acoustics for research and monitoring.
- 100          The Committee reviewed and adopted recommendations of the Second Session of the IOC-WMO Intergovernmental WOCE Panel, Paris, 3-4 March 1992. These Recommendations proposed *inter alia* to organize a WOCE Conference in late 1993 or early 1994, and the establishment of a network of informal contacts among resource managers in each country. **The Executive Council endorsed Recommendation OPC-V.1, including the statement that the Intergovernmental WOCE Panel would henceforth report directly to IOC Governing Bodies.**
- 101          The Committee recognized the need to co-ordinate the proposed pilot project on coastal ocean circulation, within the framework of the Joint UNEP-IOC-WMO Long-Term Global Monitoring System with activities under the COASTS programme as well as with proposed coastal circulation projects in the WESTPAC and East Africa regions. The Committee recommended that the planning of pilot projects on coastal circulation in the WESTPAC and IOCINCWIO regions be initiated, and invited UNEP to co-sponsor such actions.
- 102          The Committee reviewed the activities undertaken by IOC and SCOR and consultations between these two bodies on the proposal to establish an IOC Group of Experts on the Application of Marine Acoustics to IOC Programmes. While the Committee recognized the potential importance of acoustic methods for GOOS, it nevertheless believed that it would be premature to establish the proposed Group of Experts within the framework of GOOS, and recommended that the Executive Council consider other forms of exchange of information on marine acoustics, particularly through series of Workshops and/or designation of rapporteurs.
- 103          The Committee considered the proposal on the extended Continuous Plankton Recorder Survey (Document IOC/INF-869) and agreed on the importance of the proposed extended CPR survey to the GOOS modules for monitoring and assessment of marine living resources, climate and coastal zone management and development, and particularly in relation to the pilot project on monitoring of changes in plankton community structure. The Committee therefore recommended that the Executive Council approve this proposal as an international effort in support of GOOS, to be further developed in collaboration with the OSLR programme.
- 104          The Committee also considered the concept of Large Marine Ecosystems (LME) as a potential holistic approach to ocean monitoring. It recommended that thorough evaluation of the concept for use in GOOS be made by the proposed GOOS Technical and Scientific Advisory Panel as well as the Group of Experts on OSLR.

- 105        The Committee also reviewed IOC activities with regard to the UNCED, the IPCC and the INC for a Framework Convention on Climate Change, especially in the context of the role of the oceans in climate and global change and the importance of GOOS in providing for adequate global ocean observations.
- 106        The Committee requested the Secretariat to continue its work on these activities and urged Member States to renew their efforts to brief their Delegations to UNCED on the need to support vigorously a substantial ocean component in Agenda 21.
- 107        The Committee gave particular attention to planning for the Global Ocean Observing System. Relevant Recommendations and conclusions of the Committee were considered by the Executive Council under Agenda Item 5.5.
- 108        The Delegate of Spain informed the Executive Council of an ocean research cruise between the Canary Islands and Florida aboard the RV HESPERIDES (July 1992) as a WOCE programme contribution.
- 109        The Executive Council endorsed proposals contained in the Executive Summary of OPC-V. Some Delegates proposed amendments to the Executive Summary and Recommendations of OPC-V and these will be incorporated in the final report of the Committee.
- 110        The Executive Council also considered the Recommendations of the Fifth Session of the WMO-IOC Intergovernmental TOGA Board (Paris, 14-16 January 1992) (Document WMO-IOC/TOGA-V/3S). The Executive Council supported the Board's initiative to set up a network of regional and national application centers and urged Member States to make provisions for continuing support of TOGA ocean observing systems, which will contribute to a major component of GCOS and the climate module of GOOS. The Executive Council shared the concern expressed by the Board with regard to some cases of vandalism of moorings in the COARE area. The Executive Council felt that these issues should be addressed to the process of international negotiations in the framework of the Draft convention on ODAS in order to provide legal protection against vandalism of automatic scientific equipment in international waters. Many Delegates reported on participation of their countries in TOGA. The Executive Council adopted the decisions and recommendations of the Fifth Session of the TOGA Board.
- 111        Prof. J. O'Brien, Chairman, Committee on Climatic Changes and the Ocean (CCCCO), presented a report on CCCCO activities, including its Twelfth Session (Woods Hole, USA 4-8 June 1991). The CCCCO initiated an examination of climate variabilities on interdecadal time scales from a multidisciplinary view. An *ad hoc* Group Meeting on Interdecadal Ocean Climate Variability (Honolulu, USA, 18-20 February 1992) identified: (i) hydrological, sea-ice, oceanic, and atmospheric events in terms of a negative feedback loop which suggests the existence of self-sustained climatic oscillations in the Arctic with a period of about 20 years, and (ii) indication of the existence of an extra-tropical decadal trend in the Asian monsoon and the Pacific circulation on the basis of recent research results. The CCCCO is encouraging the development of research into interdecadal ocean climate variability as its highest priority new research effort.
- 112        The CCCCO is pursuing with JGOFS the investigation of carbon dioxide gas exchange on a gyre-global scale. Studies are currently underway to investigate the oceanic bio-geochemical processes relating to the cycle of carbon in the ocean and to assess the capacity of the ocean for absorbing CO<sub>2</sub>. A central question being addressed relates to the role of the ocean and its circulation in the uptake of CO<sub>2</sub> produced from the burning of fossil fuels. This uptake occurs via both physical and biological processes. Neither is well quantified on a global scale, and the regulation of the biological processes is at present only poorly understood. In particular, the bio-geochemical processes responsible for the long-term storage of a portion of the total primary production cannot be resolved sufficiently in time and space to say how they might be affected by climate change.
- 113        Progress was noted in the development of a conceptual design for the climate component of the Global Ocean Observing System (GOOS). The first of a series of background reports entitled "The Role of Models in an Ocean Observing System" has just been released by the Ocean Observing System Development Panel (OOSDP). The CCCCO Executive Group attended, as part of the Joint Scientific Committee (JSC) for the World Climate Research Programme (WCRP), the Twelfth Session of the JSC (Bremen, Germany, 18-23 March 1991). This was the first formal meeting provided for under an agreement by ICSU, WMO, and the IOC which was reached in the fall of 1990. The purpose of this new arrangement is to provide a single focus for all WCRP decisions and to bring the oceanographic community into full participation in the WCRP.

114 The Secretary IOC stated that the Agreement between WMO, ICSU and IOC for the co-sponsorship by IOC of the WCRP had been negotiated for signature by the Chairman IOC. The Executive Council approved the arrangements negotiated by the Secretary IOC for IOC co-sponsorship of the WCRP and agreed on the transition of CCCO into a technical and scientific advisory panel for GOOS. The Executive Council supported the continued promotion and development of research into interdecadal ocean climate variability and the continuation within the transformed CCCO of activities involving multidisciplinary climate research which would not be under the purview of the JSC. The Delegate of the USA stated that the USA would continue support to the CCCO Secretariat during the transition period. Dr J.O. Stromberg, President of SCOR, noted IOC co-sponsorship of the WCRP and supported the subsequent transformation of the CCCO into a technical and scientific advisory panel for GOOS. SCOR will co-operate with IOC in the transition process which will include a review and modification of the CCCO Terms of Reference.

#### 5.5 GLOBAL OCEAN OBSERVING SYSTEM AND GLOBAL CLIMATE OBSERVING SYSTEM (GOOS and GCOS)

115 This Item was introduced by brief scientific presentations on GOOS:

- (i) GOOS Objectives and Modules by Dr. D.J. Baker
- (ii) Ocean Modelling by Prof. J. O'Brien
- (iii) Biological Applications by Dr. R. Dickson
- (iv) Large Marine Ecosystems by Dr. K. Sherman

116 Dr. Pablo Lagos also made a presentation on 16 March entitled *"El Niño and Peru: A Nation's Response to Inter-Annual Climate Variability"* (See Annex IV).

117 The Chairman of the IOC Committee on Ocean Processes and Climate, Dr. D.J. Baker, introduced the decisions and recommendations of the Fifth Session of the IOC Committee on Ocean Processes and Climate related to GOOS (Document IOC/OPC-V/3S). Particular attention of the Executive Council was drawn to the Recommendations of the Committee on the development plan for GOOS (Recommendation OPC-V.3), on the global monitoring system of coastal and near-shore phenomena related to climate change (Recommendation OPC-V.2), and on the proposed international mechanism for GOOS development (Recommendation OPC-V.4).

118 The Committee agreed that the draft GOOS Development Plan (Document IOC/EC-XXV/8 Annex I) identifies basic principles governing the objectives of GOOS and action items to be taken by Member States and international groups, and outlines the rationale and next steps for the implementation of GOOS.

119 The draft plan defines 5 GOOS modules based on sets of aims to be achieved and products to be produced:

- (i) Climate Monitoring, Assessment and Prediction
- (ii) Monitoring and Assessment of Marine Living Resources
- (iii) Coastal Zone Management and Development
- (iv) Assessment and Prediction of the Health of the Ocean
- (v) Marine Meteorological and Oceanographic Services.

120 It also defines that GOOS will consist of the following major elements:

- (i) Measurement System
- (ii) Data and Information Management
- (iii) Data Analysis, Preparation and Dissemination of Data Products
- (iv) Modelling
- (v) Technical Assistance, Training and Technology Transfer.

121 The draft plan also proposes relationships between GOOS and GCOS, and international research and operational programmes, including GEMS-Earthwatch, and includes major provisions and actions, both on national and international levels, required for successful planning and gradual implementation of GOOS, particularly for the 1992-1995 period.

122 The Executive Council agreed with the proposal of the Committee on OPC (Recommendation OPC-V.3) that the draft plan would need further careful and extensive review by Member States and recommended that the draft plan with the amendments made at OPC-V and this Session of the Council be circulated to Member States and international organizations for review and comments by 1 October 1992 and then submitted with these comments to the First Session of the IOC Committee for GOOS.



- 123 Dr. D.J. Baker then presented to the Council the proposal of the IOC Committee on Ocean Processes and Climate on the international mechanism for GOOS development (Recommendation OPC-V.4). By this recommendation the Committee proposed to establish the IOC Committee for GOOS and the GOOS Technical and Scientific Advisory Panel.
- 124 **The Executive Council considered these proposals. The Council recognized** that the Global Ocean Observing System (GOOS) is to be coastal as well as global and multi-disciplinary in nature and is progressing rapidly from an abstract concept to an operational system. In order to implement GOOS, it is essential to have effective mechanisms for proper planning. **The Executive Council endorsed** the proposal by the Committee on Ocean Processes and Climate that it be restructured to become the IOC Committee for GOOS. This Committee will serve as the intergovernmental forum for promoting GOOS. Membership will be Member States of the IOC, as with the OPC, but it will be important that representatives be in a position to make national commitments for GOOS.
- 125 **The Executive Council also approved** the proposal to establish a GOOS Technical and Scientific Advisory Panel to advise the IOC Committee for GOOS on all scientific and technical aspects of GOOS. **The Executive Council noted** that these functions constitute a logical function for the transformed Committee on Climatic Changes and the Ocean (CCCCO), particularly in view of the proposed transfer of many present CCCCCO functions to the Joint WMO-IOC-ICSU Scientific Committee for the World Climate Research Programme.
- 126 Ms. Muriel Cole, IOC Secretariat, summarized the plans for the UNEP-IOC-WMO Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change as approved by Resolution XVI-10. Six pilot activities are included: (i) sea level changes and coastal flooding, (ii) coastal circulation, (iii) assessment of organic carbon accumulation in surface coastal sediments, (iv) changes in plankton community structure, (v) benthic communities: coral reef ecosystems, and (vi) terrestrial vegetation: mangroves communities. The decision was made to proceed first with the coral reef and mangrove pilot activities. Accordingly, an expert meeting was convened (Monaco, 9-13 December 1991), co-sponsored by UNEP, IOC, WMO and the International Union for the Conservation of Nature (IUCN) - World Conservation Union. The report (Document UNEP-IOC-WMO-IUCN/GCNSMS-II/3) includes action plans for monitoring coral reefs and mangroves. **The Executive Council noted with appreciation** that the manual of methodologies of the ASEAN-Australia Living Coastal Resources Project is being made available for publication by IOC for use in these activities. **The Council noted** the interest of a number of Member States in coral reef and mangrove monitoring.
- 127 **The Executive Council endorsed** the recommendations of the Fifth Session of the Committee on Ocean Processes and Climate concerning these coral reef and mangrove activities and the plans for the other 4 pilot activities, and expressed its satisfaction at the co-operation with UNEP.
- 128 **The Executive Council noted with satisfaction** actions taken by the Executive Heads of IOC, WMO and ICSU in relation to the establishment of the Global Climate Observing System (GCOS) as a joint effort of WMO, IOC and ICSU and the setting up of the Joint WMO-IOC-ICSU Scientific and Technical Committee for GCOS and the Joint Planning Office for GCOS, to be located at the Secretariat of WMO.
- 129 **The Executive Council endorsed** the concept that the climate module of GOOS provides the ocean component of GCOS. The Council instructed the Secretary to develop further, jointly with WMO and ICSU, required practical arrangements in order to ensure urgent attention to this module of GOOS and close interaction and co-ordination of the planning and development of the GOOS climate module as a common component of GOOS and GCOS.
- 130 **The Executive Council expressed** its appreciation to the Chairman OPC and to the Secretariat for the substantial progress made in pursuing the GOOS initiative during the past year.
- 131 **The Executive Council noted** the importance of existing systems such as IGOSS, GLOSS, DBCP, IODE and WWW, as well as satellite activities, IOC coastal programmes and GIPME-MARPOLMON. In particular, **the Council noted with approval** IOC's interaction with the Committee on Earth Observations Satellites. Many Delegations commented on their present activities under these programmes. **The Executive Council observed** that GOOS would serve as a co-ordination mechanism for new and existing systems rather than attempt to manage them.

- 132        **The Executive Council observed that GOOS represents an ambitious, important and expensive endeavor for the IOC and a major effort for developed as well as developing countries. There is a need to develop a long-term consolidated plan with firm resource commitments. This endeavor will require a significant increase in the resources of the IOC (both personnel and budget) or a re-direction of sequential existing resources or both. The Executive Council noted the need to establish priorities in the implementation of GOOS in order to use the limited resources in the most efficient manner. The Executive Council directed the Secretariat to pursue efforts to obtain extra-budgetary support from sources such as the Global Environmental Facility and UNDP. In endorsing the importance of GOOS, a number of Member States noted that they are establishing national structures for GOOS support. The Executive Council recommended that such structures for GOOS should be established, as far as possible, within existing IOC national mechanisms.**
- 133        **The Executive Council noted the Draft Plan for GOOS as amended by OPC-V and made the following particular points. Effective and efficient data and information management as well as model and analysis development should be an integral part of GOOS. All Member States should participate in GOOS as equal partners; each should contribute to the planning and implementation.**
- 134        **Many Member States need both technology transfer and training to participate fully and benefit from the system. To ensure this, TEMA must be made an essential component of GOOS. The programme should go hand-in-hand with programmes and financial resources for the training and education of human resources at a high level, in order to allow developing countries to play their respective parts in obtaining, assimilating and utilizing information from the resulting investigations. The Executive Council also reiterated that GOOS must cover a broad range of activities, in addition to those related to climate. Coastal aspects, in particular, were emphasized.**
- 135        **Some Delegates expressed concern about the inclusion of a coastal zone management module. There needs to be a clear distinction between global monitoring activities and the national prerogatives of management. It is necessary to harmonize the need for knowledge and a reasonable development with respect of the sovereignty of natural resources and their handling by each Member State. The Executive Council referred this to the proposed IOC Committee for GOOS.**
- 136        **There is a need for IOC to be flexible in co-ordinating its activities with the activities of other international organizations to provide for the most efficient and effective development of the GOOS and GCOS. In particular it is necessary for a high level of co-ordination with the INC/FCCC, IPCC and UNCED processes. There is also a need to co-ordinate GOOS activities with those of the national and global research activities and to emphasize the benefits of GOOS beyond research activities (i.e., fisheries).**
- 137        **Representatives of the WMO and UNEP expressed the strong interest of their organizations in a broad range of GOOS activities. The Executive Council noted with great satisfaction existing co-operation with WMO and UNEP in GOOS, especially in planning for the GOOS Climate Module and in implementation of coastal pilot activities. The Council believed that formal arrangements should be further pursued by the Secretary IOC bearing in mind the particular interests of these organizations in relation to specific modules.**
- 138        **The Council noted with appreciation the offer of France to second an oceanographer as the IOC representative at the Joint Planning Office for GCOS at WMO, in Geneva.**
- 139        **The Executive Council decided that the Group of Experts on GLOSS should be a subsidiary body of the IOC Committee for GOOS and that the Group of Experts on GLOSS should consider examination of global sea-level trends.**
- 140        **The Delegate of Brazil recalled his proposal for a course on the measurements and analysis of sea-level for Portuguese- and Spanish-speaking experts, that had been very well received at the Sixteenth Session of the Assembly, but had not yet been implemented for financial reasons. Considering that the course has a regional interest and a low cost (US\$ 17,000), the Delegate of Brazil asked that it be supported by the Commission through TEMA. He pointed out that during 1992, Brazil will be establishing 8 satellite transmitting tide-gauge stations in the coastal area of the North-east province. This programme is being implemented through the Instituto Nacional de Pesquisas Especias' (INPE) Ocean Programme. A proposal is presently being discussed between INPE and ORSTOM regarding the optimum design strategy for an integrated monitoring system.**

141       **The Executive Council noted the need to give particular attention to the development of new technologies and their application to the GOOS. The Executive Council supported the establishment of a group of rapporteurs on marine acoustics. The Observer from ECOR noted several of its activities related to GOOS and offered to provide a rapporteur for the marine acoustics activity in the area of suspended sediments.**

142       **The Executive Council approved Resolution EC-XXV.3**

#### 5.6           **INTEGRATED GLOBAL OCEAN SERVICES SYSTEM (IGOSS)**

143       **The Chairman of the Joint IOC-WMO Committee for IGOSS, Prof. D. Kohnke, introduced this Agenda Item referring to the IGOSS-VI Final Report. He highlighted the main outcome of the Sixth Session of the Joint Committee (Geneva, 18-27 November 1991). The sea-level programme and the Global Temperature/Salinity Pilot Project (jointly with IODE) proved to be highly successful in contributing to an improved quality and flow of oceanographic data for the benefit of WCRP as well as operational activities. The first issue of the IGOSS Products Bulletin was published in September 1991, and had been well received. The Chairman thanked France for the contribution provided for its publication. One topic of concern is the decrease in the number of BATHY/TESAC report exchanges over the GTS starting in mid-1991 (whereas the previous years had seen an increase) because of financial constraints facing Russia, which was the main contributor to BATHY/TESAC.**

144       **The Chairman of IGOSS expressed concern for the way IGOSS was presently funded. The increase in the number of IOC programmes led to a decrease in the amount of money available to each of them as the Regular Budget remains the same or has even decreased. Operational and long-term observing programmes need regular funding over an extended period of time, at both national and international levels. Appropriate measures should be taken in this respect.**

145       **IGOSS matters had been touched upon by many Delegations in the debate about GOOS, and the Council did not want to repeat itself at this point of the Agenda.**

146       **The Executive Council stressed the fact that IGOSS would definitely contribute to GOOS as an operational element, although the exact future institutional relationships of these programmes will need to be further elaborated in consultation with WMO. The Executive Council commended IGOSS and wished the System continued success in supporting the WCRP as well as in contributing to operational activities including weather forecasting. The Executive Council emphasized that all efforts should be made to increase the number of data exchanged internationally within the framework of IGOSS. In view of the political changes the world is experiencing, Navies could consider declassifying and exchanging data in an operational mode. Finally, the Executive Council emphasized that the efforts undertaken by IGOSS to demonstrate the socio-economic benefits that can be derived from the system should be continued, and also stressed that those studies would undoubtedly benefit GOOS.**

147       **The Executive Council adopted Resolution EC-XXV.4**

#### 5.7           **INTERNATIONAL TSUNAMI WARNING SYSTEM IN THE PACIFIC**

148       **The Chairman of the ICG/ITSU, Mr. R.H. Hagemeyer, introduced the Summary Report of the Thirteenth Session of the IOC International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU) Ensenada, Baja California, Mexico, 10-13 September 1991 (Document IOC/ITSU-XIII/3) and expressed his thanks to the Government of Mexico, and particularly, to the Centro de Investigacion Cientifica y de Educacion Superior de Ensenada for providing excellent facilities for the meeting.**

149       **He highlighted the main achievements of the ICG/ITSU in 1990-1991, among which figures the development of the project proposals on the Pacific Rapid Response System, on the Tsunami Inundation Modeling Exchange, on Programmes for Public Education and Awareness and the activities of ITIC.**

150       **It was especially emphasized that the ICG/ITSU had always paid much attention to TEMA-related activities, and the visiting expert programme and education programmes were presented as examples.**

151       **The Chairman referred to a review of accomplishments relative to the actions proposed in the Master Plan for ITSU in the Pacific adopted in 1987 at ITSU-XI. The Executive Council noted that significant progress had been made in meeting the Master Plan objectives and supported the decision of ITSU-XIII to make a thorough review of the progress and report the results to ITSU-XIV.**

152 The Chairman of the ICG/ITSU reported that it seemed as if UNDP had finally agreed to provide limited funding of up to about a quarter of the proposed budget for the project on a Regional Tsunami Warning Centre for the South-West Pacific. He called upon the IOC Member States to provide lacking funds. He finally informed the Council that the idea of expanding the ICG/ITSU area of operational responsibility to other areas was not advisable under the present very stringent financial restraints, although ICG/ITSU had a strong desire to share its expertise with other programmes and regions.

153 The Executive Council expressed its thanks to the Members of the ICG/ITSU and its Chairman for the activities of this most important Committee of the IOC dealing with operational monitoring and warning.

154 The Executive Council also expressed its appreciation to the Director-General of UNESCO and the Secretary IOC for the additional monetary support of the ICG/ITSU during 1990-1991 and urged the continuation of an augmented level of funding during 1992-1993.

155 The Executive Council stressed the high priority of the programme and urged the Secretary IOC to endeavour to provide the necessary funding to the projects outlined in the Summary Report of ITSU-XIII, particularly for the TIME project and to programmes of public education and awareness.

156 The Executive Council agreed that projects related to storm-surge mitigation and sea-ice studies should not be initiated within the framework of the Tsunami programme in spite of their close relation to the objectives of the International Decade of Natural Disaster Reduction (IDNDR).

157 The Executive Council approved the Summary Report of ITSU-XIII and adopted Resolution EC-XXV.5.

#### 5.8 CO-ORDINATION OF COASTAL ZONE PROGRAMME ACTIVITIES

158 The Secretary IOC introduced this Agenda Item referring to the Document IOC/EC-XXV/8 Annex 2, and the Programme Area II Resolution of the 26th General Conference of UNESCO, which, together, represent the present response to Resolution XVI-11.

159 Many Delegates stressed the importance of co-ordinating the coastal zone programmes with international organizations and regional initiatives concerned with integrated coastal zone management and rational use of resources therein.

160 Some Delegates stressed that coastal zone jurisdiction falls within the competence of the States, and this must accordingly be taken into account.

161 The Executive Council noted with satisfaction the progress achieved by IOC, UNESCO and UNEP in consultation with other organizations in this field including the World Bank, and encouraged the Secretary IOC to continue to proceed along this line.

162 The Executive Council instructed the Secretary IOC to further co-ordinate international programmes in the coastal zone so as to achieve a global, holistic and scientifically based approach to interdisciplinary coastal zone research, systematic observations and related capacity and capability building, in the service of the national management responsibilities.

#### 6. TRAINING, EDUCATION, AND MUTUAL ASSISTANCE IN THE MARINE SCIENCES (TEMA)

163 Prof. Michel Vigneaux, Chairman of the Committee on Training, Education and Mutual Assistance in the Marine Sciences (TEMA), introduced this Agenda Item by referring to the Report on Intersessional Activities (Document IOC/EC-XXV/6) and TEMA implementation during 1991. He added that efforts were being made to develop a programme for scientists in developing countries to obtain advanced degrees. The proposed programme would allow selected candidates from developing countries to carry out most degree-related research at their home institution, with the opportunity of short visits to supervisors' institutes to develop their research.

164 He also emphasized that TEMA components should be closely linked to the Commission's programmes, in order to use available funding effectively. There is an urgent need to organize practical training courses directly related to on-going global and regional programmes and efforts should be made to mobilize extra-budgetary resources, including in-kind support by Member States, so that such courses could be organized more frequently.

- 165 The Chairman stressed the importance of active involvement of IOC Action Addressees in TEMA activities in order to co-ordinate training needs more effectively as well as to promote approved extra-budgetary projects through frequent contacts with national authorities.
- 166 Dr. John Phillips, The Open University (United Kingdom), outlined the proposed curricula in marine environmental education at tertiary level (Document IOC/EC-XXV/Inf.4). The proposed course is designed for university students to provide better understanding of the marine environmental issues and managerial principles for sound management of marine environment.
- 167 Many Delegates stressed the importance of TEMA activities to encourage involvement of their scientists in IOC Programmes, and recommended that the TEMA Programme be strengthened. They supported the proposed higher degree programme through on-the-job research, drawing attention to the need for extra-budgetary resources.
- 168 Some Delegates informed the Executive Council that similar arrangements exist on a bilateral basis and expressed the hope that such a scheme could be applied widely for the benefit of developing Member States.
- 169 Many Delegates expressed their interest in the proposed curricula but suggested detailed study before finalization, including the need to allow for basic equipment.
- 170 The Delegate of Indonesia noted that the UNESCO Regional Office for Science and Technology for South-east Asia (ROSTSEA) is preparing a similar project for the Asian region and that the two proposals should be amalgamated.
- 171 The Executive Council stated that the target user should be managers, especially middle level managers, and/or decision-makers and, to a certain degree, school teachers for public awareness. The course period should be shortened to about one year and focused on management and planning of rational (sustainable) development and use of the marine environment and its resources.
- 172 The Delegate of France announced that the French Government will be organizing a workshop on coastal processes and management for the benefit of countries in Latin America. France will also take the necessary steps to offer participation in French research cruises to scientists from this region.
- 173 The Delegate of Japan announced that 5 scientists would be invited to join research cruises and 3 to participate in oceanographic data training courses in 1992, utilizing the contribution of Japan to IOC through UNESCO Funds-in-Trust.
- 174 The Delegate of Argentina informed the Executive Council on the results of a very successful IOC Training Course on Oceanographic Data Management, held in his country in May 1991, and of the intention of Argentina to organize another course in the same field in the autumn of 1992 for Spanish-speaking countries of South America.
- 175 The Delegate of China invited scientists from the WESTPAC Region to participate in a research cruise planned for TOGA in 1992, and expressed the willingness of China to host and help organize a training course on marine information management and ASFA as an IOC-TEMA activity.
- 176 The Delegate of Venezuela informed the Executive Council of the intention to hold a Workshop on Red Tides and Mortality of Marine Organisms in Cumana, in September 1992, with the support of IOC-IOCARIBE and the Venezuelan Government.
- 177 The Delegate of Russia announced plans to organize training courses in marine geology in September/October 1992 and in oceanographic data processing and GF-3 in April/May 1993.
- 178 The Delegate of Kenya provided information on an International Symposium on Large Marine Ecosystems, to be held in Mombasa, in August 1992, and requested the IOC to support this activity.
- 179 Recalling the need to ensure full implementation of the UNESCO/IOC Comprehensive Plan, the Executive Council stressed the importance of Marine Science Country Profiles as a useful tool to analyze the situation of Member States and to design assistance projects to reinforce marine science research capabilities. The IOC Voluntary Co-operation Programme should be strengthened, based on the experience of the World Meteorological Organization.

180 Noting the relevance of many bilateral projects to the IOC programmes, the Executive Council urged all IOC Member States to consider establishing National Oceanographic Commissions to strengthen on-going activities and ensure a better interface between national programmes and those of IOC.

181 The Executive Council noted the progress in the implementation of the TEMA Programme, despite the limited available funds and staff shortages, and recommended that steps be taken to improve the resource situation.

182 The Executive Council expressed its appreciation to the Group led by Dr. John Gray for its efforts to draft a marine environmental education curriculum. The Executive Council requested that its comments made during the consultation on this proposal be taken into account in further development.

183 The Executive Council expressed its appreciation of the offers made by Member States including Argentina, Brazil, China, France, Japan, Kenya and Russia, and noted information provided on training courses and symposia.

184 The Executive Council adopted Resolution EC-XXV.6.

## 7. DEVELOPMENT OF REGIONAL PROGRAMMES

### WESTPAC

185 Prof. Su Jilan, the Acting Chairman for WESTPAC, introduced this Agenda Item referring to Document IOC/EC-XXV/6 and IOC Workshop Report No. 76.

186 He informed the Council that the IOC/WESTPAC Scientific Symposium on Marine Science and Management of Marine Areas of the Western Pacific was successfully organized in Penang, Malaysia, 2-6 December 1991, with approximately 150 participants from 25 countries both within and outside the WESTPAC region. About 90 scientific papers were presented on the 4 main topics identified for the Symposium. In addition, a special session on Western Boundary Currents and Inter-Decadal Variation was organized jointly by the CCCO Pacific Panel and the WESTPAC project on Co-operative Studies of Ocean Dynamics in the Northwest Pacific.

187 The IOC Workshop on River Inputs of Nutrients to the Marine Environment in the WESTPAC Region was held in Penang, Malaysia, 26-29 December 1991. The Workshop reviewed the progress made in the studies of the identified river systems since the last experts consultation (Dalian, China, April 1990). The Workshop recommended: (i) intercalibration exercises, preferably in early 1992, among the participating laboratories, by correspondence, using solid nutrient samples to be provided by the IOC/WESTPAC; (ii) a Joint Symposium with the eutrophication programme and related projects, to review the results of the study of nutrient transport of the rivers, in late 1993 or early 1994.

188 The Executive Council expressed its appreciation to the Government of Malaysia for hosting the Symposium.

189 Regional training activities, including shipboard training and a data management training course, have continually been carried out in the WESTPAC region through Japanese support.

190 The main task for the Sub-Commission for 1992-1993 is to continue to implement the Medium-Term Plan proposed by the First Session of the Sub-Commission and approved by the Sixteenth Session of the IOC Assembly.

191 The Secretary IOC informed the Council on the progress made in the consultations with the Government of Thailand on the establishment of the IOC Regional Secretariat for WESTPAC. An Agreement Letter between the Thai Government and the Director-General of UNESCO has been negotiated.

192 In suggesting that closer co-operation should be established between IOC/WESTPAC and other organizations in the region, some Delegates felt that an initial approach in this respect could be:

- (i) acceptance of an invitation to IOC to be present at the First Annual meeting of PICES (Victoria, British Columbia, Canada, 12-17 October 1992);

- (ii) improved co-ordination with other international organizations in the region, e.g., ASEAN, CCOP and SOPAC on certain studies, such as coastal dynamics, marine pollution research and monitoring, and ENSO events.

193 The Delegate of Australia expressed willingness to continue support to WESTPAC activities in the form of funds and expertise.

194 The Executive Council expressed its satisfaction with the progress of the WESTPAC activities during the intersessional period, especially the successful organization of the WESTPAC Scientific Symposium, at which a number of young scientists from the region had participated.

195 The Executive Council also noted that the Second Session of the IOC Sub-Commission for WESTPAC should be organized not later than the end of January 1993, hopefully in Bangkok, and welcomed the fact that the Observer of Thailand had transmitted the IOC's request in this respect to the relevant Thai authorities.

196 The Executive Council recognized the importance of establishing the Regional Secretariat for implementation of WESTPAC projects and development of regional programmes on marine science and management, and instructed the Secretary IOC to continue consultations with the Government of Thailand and to take urgent action to set up the Secretariat upon signature of the official agreement between the Thai authorities and the Director-General of UNESCO.

#### Caribbean and Adjacent Regions (IOCARIBE)

197 Dr. Fernando Robles, IOC Senior Assistant Secretary for IOCARIBE, introduced this Agenda Item, referring to the evaluation made during the Second Meeting of IOCARIBE Officers, San José, Costa Rica, 20-23 February 1992.

198 Following Recommendation SC-IOCARIBE-I.6, the Chairman of the Sub-Commission will prepare, with Secretariat support, a proposal aimed at developing a regional component and network for TEMA, to be presented at the next session of the Sub-Commission (SC-IOCARIBE-IV).

199 The Officers Meeting discussed the possibilities of establishing an IOCARIBE Trust Fund and the Secretary IOC and IOCARIBE Secretariats were requested to prepare a document on this issue for submission to SC-IOCARIBE-IV.

200 The Delegate of Mexico informed participants of his country's offer to hold the Fourth Session of the Sub-Commission in Vera Cruz or Cancun towards the end of 1992.

201 The Executive Council thanked the Delegate of Mexico for his country's offer to host SC-IOCARIBE-IV.

202 The Executive Council supported the development of an IOCARIBE-TEMA component and instructed the Chairman, the Secretary IOC and the IOCARIBE Secretariat to present a relevant position paper to the next session of the SC-IOCARIBE.

203 The Executive Council concurred with the need to improve communication at the regional level and instructed the Secretary IOC and the IOCARIBE Secretariat to examine means and resources so as to expand the electronic mail system in the region accordingly.

204 The Executive Council recognized the advantages of an inter-regional approach in the implementation of selected research and services programmes of the Commission.

205 The Executive Council noted with satisfaction the successful implementation of the Joint IOC-UNEP CEPOL Programme for Marine Pollution Research, Monitoring and Abatement in the IOCARIBE region, and stated that this approach should be adopted in other similar regional programmes.

206 The Executive Council expressed its appreciation for the support provided to IOCARIBE by Member States, in particular by Canada, Colombia, France, Sweden and the United States.

### South-Eastern Pacific

- 207 Dr. Fernando Robles, IOC Senior Assistant Secretary, presented this Agenda Item referring to the Summary Report of the Seventh Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of "El Niño" (Cartagena, Colombia, 16-18 January 1992) (Document IOC-WMO-CPPS/El Niño-VII/3S).
- 208 The Joint Working Group reviewed global and regional investigations and services relevant to ERFEN, TOGA, WOCE, GLOSS, IGOSS and GOOS. Regarding the latter (GOOS), the Joint Working Group strongly recommended that during discussions of ocean-related issues at UNCED and IOC meetings, Member States strongly support such issues, and particularly the IOC proposal for the development of GOOS. The Joint Working Group also emphasized the need to strengthen Member State internal mechanisms so as to expedite GOOS implementation.
- 209 The Executive Council endorsed the Report and Recommendations of the Seventh Session of the Joint IOC-WMO-CPPS Working Group on El Niño.
- 210 Regarding the application of UNDP RLA/88/010 resources to support regional activities (particularly the ERFEN Programme), the Executive Council recommended that these resources be decentralized to regional units of both IOC and CPPS.
- 211 Regarding the proposed establishment of an Inter-American Institute on Global Change Research, the Executive Council supported the inclusion of the ENSO topic as a research priority for such an institute.
- 212 The Executive Council re-stated the need to maintain the support provided through the TOGA (Pacific) Programme to the South-east Pacific region, so as to ensure the continuity in forecasting and monitoring the El Niño phenomenon in that region, particularly through the near real-time monthly publication of the Climate Alert Bulletin (BAC).

### Southern Ocean

- 213 The Secretary of IOC informed the Council on the activities of IOC related to the study of the Southern Ocean. Following instructions given by the Sixteenth Session of the IOC Assembly (Agenda Item 8.2), the major efforts of IOC in the Southern Ocean had concentrated on the development of ocean observations and data management systems through the relevant activities of IGOSS, GLOSS, DBCP and IODE, through the research activities of WOCE (ocean circulation and climate), GIPME (marine pollution), and through collaboration with JGOFS.
- 214 The RNODC for SOC had been established in Argentina; IGOSS-SOC had been established in Australia; a GLOSS Workshop on sea-level measurements in Antarctica was held in 1991 in St. Petersburg (formerly Leningrad). The WOCE Core Project 2 "Southern Ocean" is under way.
- 215 IOC continued its interaction with other international organizations and bodies dealing with Antarctic issues:
- 216 In 1991, IOC was represented by observers at the Antarctic Treaty Consultative Committee (ATCM-16) and at the special meeting of ATCM in Spain; the Commission co-sponsored the Antarctic Science Conference in Germany and IOC representatives participated at a recent CCAMLR meeting (CSIRO, Australia).
- 217 The Executive Council noted with satisfaction on-going and planned IOC activities in the Southern Ocean. The Executive Council recommended that the IOC Secretariat prepare a comprehensive review paper on IOC-related research and observational activities being carried out in the Southern Ocean for submission to the Seventeenth Session of the IOC Assembly. The review could subsequently serve as a background document for soliciting Member State interest in a Sixth Session of the IOC Regional Committee for SOC. The background paper could also be used for presenting IOC-related activities at meetings of ATCM and SCAR.

### Oceanographic Co-operation in the ROPME Region

- 218 In introducing this Agenda Item, Dr. G. Holland, Canada, who chaired some of the related *ad hoc* meetings during the Sixteenth Session of the IOC Assembly (Paris, 7-22 March 1991), recalled Resolution XVI-14 dealing with Oceanographic Co-operation within the ROPME Sea Area, which among other things,



provided for the setting up of a Working Group. The first meeting of the Working Group (Paris, 12-14 June 1991) formulated an Integrated Project Plan for the Coastal and Marine Environment of the ROPME region and recommended the establishment of a Steering Committee to give the Plan operational viability. A subsequent meeting of the Steering Committee organized in co-operation with ROPME and UNEP (Kuwait, 24-27 September 1991) produced an updated and operationally viable Plan. The updated Plan was adopted by the Fourth Extraordinary Meeting of the ROPME Council (Kuwait, 16-17 October 1991) as the basis for a comprehensive assessment of pollution and a rehabilitation of the coastal and marine environment of the Region as a result of the degradation brought about by the war.

- 219 The updated Plan is sub-divided into 3 phases (ref. Document ROPME-IOC/STEER-1/3):
- (i) immediate actions which included an oceanographic cruise using the research vessel of the University of Qatar RV MUKTABAR ALBIHAR (November-December 1991);
  - (ii) short-term actions which include a 100-day cruise (mid February - end May 1992) using the NOAA RV MOUNT MITCHELL presently underway; and
  - (iii) a long-term element which will extend over two years in the first instance.
- 220 Unfortunately, repair works on the RV MUKTABAR ALBIHAR led to delays in the dates of the first cruise and eventually to its postponement to the summer of 1992. This may turn out to have some advantages because of the opportunity it now offers for the acquisition of data on summer oceanographic conditions.
- 221 Dr. Holland pointed out that the Integrated Project Plan now constitutes the coastal and marine component of the Consolidated Rehabilitation Programme (CRP) for the ROPME Region being co-ordinated by ROPME and UNEP. He stressed that in carrying the project this far, IOC has demonstrated its capacity to initiate and sustain an operational project. He thanked the United States of America for providing NOAA's RV MOUNT MITCHELL and also providing other resources for the cruise. Finally, Dr. Holland remarked that, to bring the full objectives of the IPP (including capacity building aspects) to fruition calls for resources far beyond what the Regular Programme Budget can provide and he appealed to Member States and specialized Agencies to contribute in any way they deem fit and able towards the execution of the Plan. By so doing, he concluded, IOC and co-operating bodies would have helped to rehabilitate and preserve for future generations the important but fragile ecosystems of the ROPME Region that have been so devastated by recent events.
- 222 He then introduced Commander Francesca Cava, of NOAA, who made a brief presentation highlighting the objectives and achievements so far of the MOUNT MITCHELL cruise. Ms. Cava said that the cruise is an excellent example of collaboration between Governments, organizations (both UN and non-UN) and individual scientists in responding to an obvious threat to the health of a section of the global environment.
- 223 Dr. Badria Al-Awadi (Co-ordinator, Technical and Administrative) of the ROPME, on behalf of the Executive Secretary of ROPME, who was unavoidably absent, paid tribute to the organizational ability of IOC in initiating the Integrated Project Plan, for forging the kind of collaboration Commander Cava had referred to earlier, and for its execution. Dr. Al-Awadi especially thanked the USA for providing the MOUNT MITCHELL for the cruise and expressed the hope that other Member States of the IOC would give similar support for the continued implementation of the Integrated Project Plan during and beyond its initial two-year life span.
- 224 The Executive Council took note of the formulation and on-going implementation of the Integrated Project Plan and recognized it as a viable tool for the rehabilitation and ultimate preservation of the coastal and marine environment of the ROPME Region. It congratulated the Secretary IOC for this bold initiative.
- 225 The Executive Council noted the provision by the USA of the RV MOUNT MITCHELL and of additional resources for the short-term cruise of the IPP, and thanked the United States Government for this generous support.
- 226 The Delegate of Canada announced that it had already communicated to the ROPME Secretariat an offer from Canada to evaluate the impact of oil spills and oil well fires on fish and fisheries in the ROPME area. Specifically, he mentioned the offer aimed at assisting in assessing the levels of dioxins and furans in fish samples and to assess the DNA damage to fish.

- 227        The Delegate of the Islamic Republic of Iran voiced some reservations as to the rate of progress achieved in a comprehensive assessment of the health of the Persian Gulf, which is in danger because of many different sources of pollution. He suggested obtaining help from all Member States of IOC, and not only those with interests in the region. He expressed the hope that the results of the scientific studies in the region, verified by IOC, would be brought to the attention of the countries of the region as soon as possible.
- 228        The Representative of UNEP congratulated the Secretary IOC for the Commission's contribution under the United Nations Plan of Action for the ROPME Region, and expressed the hope that the excellent co-operation which existed between the two organizations would continue in the implementation of the Consolidated Rehabilitation Programme for the ROPME Region.
- 229        **The Executive Council adopted Resolution EC-XXV.7.**
8.        **PREPARATIONS FOR THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT 1992, AND THE IMPLICATIONS OF THE UN CONVENTION ON THE LAW OF THE SEA**
- 230        The Secretary IOC introduced this Item referring to Documents IOC/EC-XXV/6, IOC/EC-XXV/8, and the reports of the IOC *ad hoc* Task Team to study the implications, for the Commission, of the UN Convention on the Law of the Sea and the New Ocean Regime, in particular of its Third Session (Paris, 17-21 December 1984), and the reports of FURES.
- 231        Following the instructions of Resolution XVI-16 of the Sixteenth Session of the Assembly, the IOC is participating in all relevant preparatory work for UNCED, including not only the "oceans item" but also the separate items related to research and capacity-building; the statement to UNCED plus the Declaration on a Global Ocean Observing System have been transmitted in accordance with the above-mentioned Resolution.
- 232        The IOC has also been represented at the Preparatory Committee sessions. The Secretary IOC referred to on-going endeavours aimed at obtaining an invitation to IOC to participate in UNCED in its own right; this effort has been reinforced by letters with this request from the Officers and Secretary of IOC, from the Director-General of UNESCO, and from one Member State.
- 233        Finally, the Secretary announced that IOC will arrange an exhibition in Rio de Janeiro at Global Forum 92, and that contributions to that exhibition have been solicited.
- 234        With reference to the second part of the Agenda Item, the Secretary IOC recalled the work by the IOC *ad hoc* Task Team which, in several aspects, was continued by FURES, and elements of which are also included in the Terms of Reference of the *ad hoc* Group for DOSS.
- 235        In the subsequent debate, the Executive Council was informed about harmonization of laws and regulations of the States signatories of the UN Convention on the Law of the Sea. It was noted that 51 States have now ratified the Convention. It was also pointed out that IOC would be attributed several specific tasks when the Convention enters into force and that this would have repercussions on many of the on-going IOC activities.
- 236        The Delegate of Brazil made a statement on the need for consideration of the implications of the entry into force of the United Nations Convention on the Law of the Sea. Besides national measures to adapt laws and regulations, the IOC should prepare itself for explicit functions conferred on it by the Convention. Efforts to ensure consistency in the past should now be continued, and he reminded the Executive Council that the *ad hoc* Study Group on IOC Development, Operational Structure, and Statutes (DOSS) had received a mandate to this effect from the Sixteenth Session of the Assembly through Resolution XVI-19.
- 237        **The Executive Council strongly endorsed efforts that IOC obtain an invitation and seat in its own right at UNCED, and it urged Member States to give all possible support to this endeavour.**
- 238        The Secretary IOC informed the Executive Council that the Secretary-General of UNCED, in a letter dated 11 March 1992, had responded to the interest of IOC in the following terms:

*"In view of the expressed interest of your Organization in contributing to preparations for the United Nations Conference on Environment and Development due to take place from 1-12 June 1992 in Rio de Janeiro, I am pleased to extend to you an invitation to the upcoming session of its Preparatory Committee. ...*

*May I also draw your attention to the fact that the 46th Session of the General Assembly, in its recent resolution on UNCED (46/168), requested the Secretary-General of the United Nations to invite to the Conference all intergovernmental organizations that have been invited to participate in the work of the Preparatory Committee. ..."*

239 The Secretary IOC expressed the view that this letter infers that the IOC will receive an invitation to attend UNCED in its own capacity as an intergovernmental body. The Executive Council expressed its satisfaction but recommended that efforts to this effect be pursued.

240 The Executive Council encouraged the IOC to continue its substantial involvement in UNCED and to consider actions for follow-up initiatives. Reference was made to the importance of the Stockholm Conference for the development of IOC programmes.

241 The Executive Council re-emphasized the great role played by the ocean and its resources in global climate change, and their effect on the environment and socio-economic development on the whole. It urged the Secretariat and Member States to make all efforts to ensure an increased awareness of this process through the intermediary of relevant international contact points of the Commission as well as the Global Environment Facility. Additional support should also be sought at the national and international levels for the implementation of IOC climate-related programmes, in particular GOOS.

242 The Executive Council noted the need for interagency co-operation, in particular between IOC, WMO and UNEP. It stressed that this on-going co-operation and partnership should be visible at and endorsed by UNCED. At the same time it emphasized that the goal was to ensure that Member States would reap the benefits of this partnership, based on the complementarity of the different organizations concerned, and involving various sectors and aspects of society.

243 The Delegate of Canada informed the Executive Council that his country, in co-operation with UNEP, is considering volunteering to host an intergovernmental expert meeting on Land-Based Sources of Marine Pollution, and felt that IOC's co-operation in this activity would also be appropriate.

244 The Representative of UNEP informed the Executive Council on the development of the Joint UNEP-IOC Proposal for Strategies for Protection and Management of Oceans and Coastal Zones (Document IOC/EC-XXV/8 Annex 2), and said that this would be presented at the UNCED Preparatory Committee meeting taking place at that time.

245 The Executive Council adopted Resolutions EC-XXV.8 and EC-XXV.9.

## 9. NEGOTIATIONS FOR A FRAMEWORK CONVENTION ON CLIMATE CHANGE

246 The Secretary IOC introduced the Item, referring to Documents IOC/EC-XXV/6 and XXV/8, and noted that Resolution XVI-1 was being implemented and that IOC was participating in the process and sessions of the INC/FCCC.

247 The Second Vice-Chairman IOC, Dr. A. Metelnikov, informed the Council on progress achieved during the Fifth Session of the INC/FCCC (New York, USA, 18-28 February 1992) in which he had participated as the IOC representative. He noted that much work remained to be done, that possibly the Chairman of the INC/FCCC would prepare a compact version of the negotiating text, and that the Sixth Session of INC/FCCC would be held in New York (29 April-5 May 1992). He recommended that the Secretary IOC ensure that relevant documents of the IOC, in particular IOC Technical Series No. 38 on the Role of the Oceans in Climate, be submitted in sufficient number of copies, and that perhaps the IOC could arrange an exhibition on GOOS on that occasion. He also suggested that the IOC establish closer links with the IPCC, and that IOC experts be invited to participate in assessments by IPCC of the role of the ocean in the CO<sub>2</sub> balance.

248 The Executive Council noted with great concern the almost complete absence at the INC Sessions of scientists involved with the associated programmes of international organizations such as IOC and WMO, in particular the WCP.

249       **The Executive Council urged** Member States to make all efforts to help ensure that the established mechanisms, institutions and programmes, especially those of WMO, IOC and UNEP, together with related procedures, e.g., data exchange, be utilized in the INC process and its follow-up. **The Executive Council noted** the importance in this context of both national ocean research centres and operational institutions.

250       **The Executive Council noted** that the oceans, including coastal and shelf seas and marine wetlands, play a large role in the net CO<sub>2</sub> emission concept, and **emphasized** that IOC could contribute greatly to efforts to establish improved assessments of that role.

251       **The Executive Council instructed** the Secretary IOC to seek closer association with the IPCC and urged Member States to help facilitate this.

252       **The Executive Council emphasized** that association with IPCC is also related to UNCED and that institutional arrangements are an important part of the overall picture. This makes it additionally important that IOC be invited to UNCED. **The Executive Council instructed** the Secretary IOC and the Chairman to facilitate Member States taking the necessary actions at national levels by circulating relevant texts. **The Executive Council also suggested** that IOC inform the INC Secretariat of its willingness to help in the preparation of documentation.

## 10. CO-OPERATION

### 10.1 THE ICSPRO AGENCIES AND IAEA AND UNEP

#### ICSPRO

253       The Chairman highlighted formal co-operation which has taken place during the past year and plans for further co-operation. Member agencies of ICSPRO met frequently during this period in the process of preparing for the UNCED, though an ICSPRO meeting did not take place. Such a meeting will likely be convened soon after UNCED. The Chairman noted that IOC is taking an active role in preparing future joint initiatives such as an intergovernmental conference on the World Climate Programme proposed for 1993. The Secretary described other examples of co-operation such as an agreement now being updated among IAEA, UNEP and IOC to support GIPME and aspects of regional IOC activities such as equipment provision, installation and use. Extensive co-operation is underway between UNEP and IOC on pollution and climate-related issues.

254       **The Executive Council expressed** its satisfaction with the extent of co-operation with WMO in all areas of mutual interest. **The Executive Council indicated** that the level of co-operation with other organizations of ICSPRO, particularly FAO and IMO, may need improvement. **The Executive Council noted** that ICSPRO is an interagency co-ordinating mechanism for ocean issues, having great potential within the United Nations System, and agreed that ICSPRO should be further strengthened so as to reinforce the co-ordination and enhancement of the Commission as a Joint Specialized Mechanism, especially in the light of expected discussions at UNCED. **The Executive Council requested** the Chairman to pursue this issue with the Director-General of UNESCO, and to suggest that a meeting of Heads of Agencies and Programmes be considered to discuss ways for future co-operation. **The Executive Council reiterated** that UNEP and IAEA should be encouraged to join ICSPRO in view of the level of their involvement in relevant activities.

#### International Atomic Energy Agency (IAEA)

255       The Secretary IOC informed the Executive Council that the Commission's main liaison with IAEA is through IAEA's Laboratory in the Principality of Monaco, and centres mainly on interaction within the context of the GIPME Programme. He said that IAEA continued to co-sponsor GESREM, one of the Expert Groups of GIPME, and has also shown active interest in the activities of one other Expert Group, GEMSI. Through this partnership, a special joint mechanism (involving also UNEP and IMO) has been set up to ensure appropriate methods development, intercalibration exercises, adequate quality control of data, data management and exchange, and training.

256       He indicated that an area of co-operation that will need to be further strengthened and expanded is that of provision and maintenance of equipment in response to the needs of developing countries, especially in the field of marine pollution research, monitoring and control. In this regard, he informed the Executive Council of the collaboration between IAEA and IOC-SAREC in the organization of a training workshop planned for May/June 1992, in Mombasa, Kenya, aimed at users of equipment for the study of marine pollution in the East African region. UNEP and FAO are also co-operating in this venture.

257 The Secretary IOC pointed out that a Memorandum of Understanding between IOC, UNEP and IAEA had been negotiated and that a response from IAEA was still awaited.

258 The Secretary also mentioned that IOC (acting on behalf of UNESCO and IAEA) partake in the activities of GESAMP.

259 The Executive Council noted the co-operation existing between IOC and IAEA and requested the Secretary IOC to take steps to strengthen and expand such ties.

260 The Executive Council instructed the Secretary to initiate discussions within UNESCO with a view to having IOC apply for formal sponsorship of GESAMP.

#### **United Nations Environment Programme (UNEP)**

261 The Representative of UNEP, Dr. Makram Gerges, conveyed to the Executive Council UNEP's entire satisfaction with the state of co-operation between IOC and UNEP in all areas of mutual interest, and with the steps taken to further enhance such co-operation in the last intersessional period.

262 In recounting what UNEP regards as landmarks in its fruitful collaboration with IOC, he referred initially to the establishment of the Joint IOC-UNEP Intergovernmental Panel on GIPME (the first session of which was held in Paris, 4-7 March 1992) pursuant to Resolution EC-XXIII.2 and UNEP Governing Council decision 16/26A, and which has conferred on UNEP the status of equal partner and co-sponsor of the GIPME programme. He was sure that this would enhance the co-ordination and harmonization of the marine pollution activities of both organizations with a view to optimizing the use of available resources and expertise, and would benefit IOC Member States and UNEP's regional constituencies in the most efficient and effective manner. Still referring to GIPME, he expressed satisfaction with the progress achieved in the International Musselwatch Project which IOC, UNEP and NOAA jointly sponsor.

263 Dr. Gerges pointed out that IOC-UNEP co-operation in the area of climate and climate change-related activities is steadily growing and broadening. In addition to the co-sponsorship of some regional Task Teams on the implications of climate change, IOC also co-sponsors, with the Association of the South Pacific Environmental Institutions (ASPEI), UNEP's Global Task Team on the Impact of Climate Change on Coral Reefs, which will convene its first meeting in Guam in June 1992.

264 UNEP and IOC, jointly with WMO, have developed a system for "Long-Term Monitoring of Coastal and Near-shore Phenomena Related to Climate Change" which now constitutes a major portion of the coastal component of GOOS. Referring to GOOS specifically, Dr. Gerges cited a very encouraging and constructive letter from the Director-General of UNESCO to UNEP's Executive Director, inviting UNEP to be involved in the further development and refinement of the system, and conveyed to the Executive Council the positive response of UNEP to the proposal.

265 Dr. Gerges gave further examples of fruitful collaboration between UNEP and IOC, such as the preparation of a joint position paper for UNCED entitled "Strategy for the Protection and Management of the Ocean and Coastal Areas" (Document IOC-EC/XXV/8 Annex 2), and to IOC's participation in the UNEP co-ordinated United Nations Inter-agency Plan of Action for addressing the environmental consequences of the war in the ROPME region. He thanked NOAA for making the RV MOUNT MITCHELL cruise a reality.

266 Dr. Gerges then stressed that although a lot had been achieved together, there was need to strengthen co-operation in other areas, for example, in Coastal Zone Management. He informed the Executive Council that UNEP is currently undertaking preliminary consultations with FAO, the World Bank and with some potential donor governments regarding the development of international guidelines for Integrated Coastal Zone Management, and said he was pleased to learn that the Deputy Secretary IOC would join the planning meeting and preliminary consultations the following week. He also called for strengthening of links between the IOC's OSLR programme and UNEP's Marine Mammals programme. He informed the Executive Council of the possible co-sponsorship by UNEP in the near future of the IOC Programme on Harmful Algal Blooms.

267 The Executive Council noted with satisfaction the existing co-operation between UNEP and IOC in many areas of mutual interest and instructed the Secretary IOC to take further steps towards the consolidation and expansion of this co-operation.

268 The Delegates of Canada and Portugal noted that, in view of present and expanding activities of UNEP on oceans, it was unfortunate that UNEP was not yet a member of ICSPRO, and that the previous invitation to UNEP to become a member of ICSPRO should be re-activated. The Executive Council invited UNEP to take steps towards becoming an active member of ICSPRO and requested the Secretary IOC and the Chairman IOC to re-activate discussions to that effect.

269 The Executive Council noted with appreciation that UNEP had invited IOC to be an active partner in the project on development of guidelines for Integrated Coastal Zone Management.

## 10.2 THE STUDY OF LEGAL ASPECTS OF OCEAN DATA ACQUISITION SYSTEMS (ODAS)

270 Prof. A. Kolodkin presented a report on the work accomplished since IOC-XVI in the field of the study of legal aspects of Ocean Data Acquisition Systems. Pending the submission of comments on the draft prepared by the Soviet Maritime Law Association (SMLA), in accordance with IOC-XVI decisions, Prof. Kolodkin undertook to study with legal experts in the Commonwealth of Independent States (CIE) several aspects of the Convention, including problems raised by the return of an ODAS entering the coastal zone and by the possible deployment of an ODAS by an international organization. Prof. Kolodkin then referred to the comments received by the Secretary IOC from Argentina, Brazil, Chile, Greece, United Kingdom and IMO.

271 The Executive Council expressed its appreciation to Prof. Kolodkin and his team for the work accomplished in this difficult and important undertaking. It stressed that the development of GOOS would encompass the use of a large amount of automated equipment, drifting or moored, surface or sub-surface based. There was definitely a need to protect this equipment against vandalism and theft, as already noted by the International TOGA Board and endorsed by the Executive Council (cf. para.110), and some legal provisions in this respect should be agreed upon internationally. The Executive Council recognized that the provisions of Articles 258-262 of the UN Convention on the Law of the Sea were insufficient in this respect.

272 On the other hand, the Executive Council agreed that the rights of the coastal states should also be taken into account in such a convention and recognized that this aspect of the question had been given insufficient consideration in the present draft. It therefore requested Prof. Kolodkin, when preparing a further draft, to bear this aspect in mind, together with IOC-XVI decisions.

273 The Executive Council considered ICSPRO to be an appropriate forum in which to hold consultations on ODAS, and that the procedures and actions agreed to by IOC-XVI (Document SC/MD/97, para.362) should be adhered to. The Executive Council reminded Member States that they should send the Secretary IOC their comments on the draft prepared by the Soviet Maritime Law Association (SMLA) (Document ICSPRO-XXVIII/3, Annex IV). It noted that an ICSPRO Session was scheduled to take place soon after UNCED and that, therefore, the amended draft convention to be prepared by Prof. Kolodkin and his team, should be ready by then.

274 Finally on this topic, the Executive Council instructed the Secretary IOC to explore with IMO and IHO, the kind of notification to mariners that is, or should be made, every time moored or drifting equipment is deployed at sea.

## 10.3 THE SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH (SCOR)

275 The President of SCOR, Prof. Jarl-Ove Stromberg, expressed his deep satisfaction with the close co-operation that has existed for many years between SCOR and IOC. He briefly described the objectives of the Committee and noted areas where achievements have been particularly visible, e.g., the CCCO, TOGA, WOCE. He mentioned that SCOR Working Groups are particularly oriented to solve short-term tasks, but recently long-term activities such as JGOFS and GLOBEC have been initiated as well. Prof. Stromberg emphasized that SCOR faces budgetary limitations and must, like IOC, identify priorities. He reiterated that the SCOR policy of working closely with active scientists in different countries was an essential contribution to IOC, effectively provided by SCOR. It was desirable that the membership of SCOR be enlarged.

276 The Executive Council expressed its satisfaction with the close co-operation between SCOR and IOC and stressed that such co-operation had been instrumental in developing some IOC activities.

277 The Executive Council requested the Secretary to consult with SCOR and ICSU in finalizing terms for a transformed CCCO, and to consider the need to address ocean research activities not being addressed by other existing or proposed groups.

278       **The Executive Council emphasized that the IOC also co-operates with ICSU and that the direct linkage with ICSU should be further strengthened, in view of the many areas and activities of complementarity.**

#### 10.4   OTHER BODIES

279       **The Executive Council requested the Secretary IOC to explore, through the Director-General of UNESCO, co-sponsorship by IOC of the Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP). The Executive Council emphasized that the considerable contributions by GIPME to GESAMP-related matters, as well as the use of the GESAMP products in IOC programmes, warrant a specific IOC involvement.**

280       **Following the positive exploratory work by the Secretary IOC, the Executive Council invited the Director-General to undertake negotiations with other sponsors with a view to obtaining co-sponsorship of GESAMP by IOC.**

281       **The Representatives of ECOR and ICES informed the Executive Council of activities of their organizations which were relevant to IOC, and underlined the need to potentially expand areas of co-operation. The Council concurred with the suggestion to co-operate further with ECOR and ICES.**

282       **The Representative of ECOR informed the Executive Council on the Committee's activities, particularly those in the area of marine robotics, and expressed its appreciation for IOC support of two of these projects, namely, the development of autonomous underwater vehicles for data gathering; modelling the impact of storm surges in coastal waters, particularly the stirring effect and its consequences for near-shore fisheries, both wild and in aquaculture systems; and the development of underwater acoustic methods for the measurement of suspended sediments. ECOR wished to nominate an IOC rapporteur for the field of acoustic methods related to the movements of suspended sediments in coastal waters.**

283       **The Representative of ICES reiterated the interest of ICES in co-sponsoring the GLOBEC programme, in maintaining the present close co-operation on IREP and in developing collaboration on IOC activities in relation to the Harmful Algal Bloom programme component.**

#### 11.   **STUDY OF IOC DEVELOPMENT, OPERATIONS, STRUCTURE AND STATUTES (DOSS)**

284       **The Chairman of the *ad hoc* Study Group on IOC Development, Operations, Structure and Statutes (DOSS) presented this Agenda Item, referring to the Summary Report of its First Session (Document IOC/DOSS-I/3), and an introductory statement he had prepared (Document IOC/EC-XXV/Inf.5). Although the views presented were still in a very preliminary stage and subject to further elaboration, he thought it important to solicit the guidance of the Executive Council which would assist the Group in the next stage of its work.**

285       **In presenting his overview, the Chairman of DOSS emphasized that one of the principles guiding the work being undertaken is that the majority of recommendations, if approved by the Seventeenth Session of the Assembly, should be reflected in amendments to the IOC Rules of Procedure. This first stage of improved definition of IOC operation and structure may eventually lead to amendment of the Statutes themselves, but this will be considered within a longer time-frame.**

286       **Referring to the close interface between many of the assigned tasks, the Chairman of DOSS also informed the Executive Council that there was already clear indication that adequate national mechanisms, such as a National Commission on Oceanography, are absolutely essential. The creation or strengthening of such bodies would not only enhance national involvement in IOC, but also create a better basis for a true ocean partnership.**

287       **Among the other tasks assigned to the *ad hoc* Study Group, the question of mobilizing financial support for IOC activities was highlighted, especially in view of the need for the Commission to present its views to UNESCO as soon as possible, in view of preliminary proposals for the 1994-95 biennium that were already being developed.**

288       **In concluding, he explained to the Executive Council that the Members of DOSS proposed an extended Session of the Council in 1993 so that the final recommendations of DOSS could be adequately discussed and so as to facilitate consideration by the Seventeenth Session of the Assembly. It had not been**

deemed necessary to arrange a one-day meeting at the present Session because the work of DOSS had not yet reached the stage where decision was required of the Council. He noted that Resolution XVI-19 only provided the option for such a one-day session, without requesting it. He also conveyed to the Executive Council the commitment of the *ad hoc* Study Group to carrying out its responsibilities to the best of its ability and within the forecast time-frame. The Third Session of DOSS is planned for late July 1992, with the goal of completing its report and recommendations for timely distribution well in advance of the Seventeenth Session of the Assembly.

289       The work of the *ad hoc* Study Group, as had been the case for previous bodies with similar mandates, generated great interest, with numerous suggestions made by Delegates to guide further development of the studies being undertaken. General endorsement was given of progress to date and particular attention drawn to:

- (i)       the need to resolve what has become a chronic problem for IOC in regard to mobilization of adequate and predictable resources;
- (ii)      the question of how the Commission should address the balancing of needs and resources, including related aspects on adequate programme review procedures, providing adequate information to IOC Governing Bodies so that they could make decisions on priorities, and development of an IOC Action Plan;
- (iii)     the advisability of review, and eventual streamlining of the subsidiary body structure of the Commission as well as clarification in the reporting and decision-making functions from one body to another; and
- (iv)      the importance of taking into account external events such as UNCED and the eventual entering into force of UNCLOS which may give rise to new circumstances and legal instruments and for which the IOC should prepare itself as the competent marine science body in the UN System.

290       In regard to comments made on the need for a better definition of what constitutes routine ocean observations within the context of the UN Convention on the Law of the Sea, the Executive Council decided that this should be considered under Agenda Item 8.

291       The Executive Council expressed its appreciation to the *ad hoc* Study Group for its interim report and progress made in carrying out its responsibilities and requested the Chairman of DOSS to ensure timely completion of assigned tasks and reporting to the Seventeenth Session of the Assembly.

## **12.     ADJUSTMENTS TO THE PROGRAMME AND BUDGET FOR 1992-1993 FOR SUB-PROGRAMME II.2.4**

292       The First Vice-Chairman introduced this Agenda Item by recalling his introductory remarks and the ensuing discussion under Agenda Item 4, with reference to his responsibilities and the action requested of the Executive Council as found in paras. 153-155 of the Action Paper (Document IOC/EC-XXV/8), notably:

*'The First Vice-Chairman will present a proposal on adjustments to the programme and budget, ... based upon the views expressed under the preceding Agenda Items. ...*

*The Executive Council will be requested to consider the proposed adjustments in the light of programmatic, funding and co-operation developments, with a view to approving the proposals made.'*

293       In referring to discussions that had taken place during an *ad hoc* Sessional Drafting Group on the Programme and Budget, the First Vice-Chairman informed the Executive Council that his consultations with those attending had led to the formulation of an initial draft resolution and guidance to the Secretary, for inclusion within the report.

294       The Executive Council agreed on the following conceptual guidance to assist the Secretary, in consultation with the Chairman and Vice-Chairmen, in making decisions regarding areas of emphasis during the present biennium in order to balance needs and resources.

295       The Executive Council believed that all current IOC programmes are both important and necessary and should be fully supported.



296 Based on IOC budget history of recent years, where there have been significant short-term changes in IOC resources, the Executive Council did not believe it is either useful or desirable to give guidance on the exact amount of funds to be allocated to specific programmes.

297 However, given the high probability that not all IOC programmes can be implemented at the same rate and during the same time-frame, the Council believed that the concepts found below should be taken into account when decisions are made to balance needs and resources during the 1992-1993 biennium:

- (i) GOOS is our most important recent initiative and will provide considerable benefits to all Member States and needs to maintain its momentum and undertake energetic development during the present biennium. Special efforts should be made to support ocean science and service programmes, regional activities and TEMA components that contribute to GOOS, both its ocean and coastal modules.
- (ii) Emphasis should also be given to support those programmes where support is shared and where IOC involvement will result in catalytic action, within the approved programmes of the Commission. These include:
  - (a) joint programmes and committees where support is shared with other organizations and institutions, such as the UN, WMO, FAO, IMO, UNEP, IAEA, UNDP, ICSU, and SCOR;
  - (b) workshops and conferences which have significant support from other sources; and
  - (c) regional programmes which receive significant support from Member States, other organizations or bilateral and multilateral donors.

298 Noting that the need to secure adequate and continuing resources has become an enduring problem for the IOC, the Executive Council requested the *ad hoc* Study Group on DOSS to consider their related tasks as being of the utmost importance so that the IOC could move towards and into the next century on a firm financial base.

299 In this context, the value of concrete Action Plans from all Subsidiary Bodies was emphasized as a means of providing required information upon which the Governing Bodies could exercise their responsibility for overall programme review. The Executive Council requested all Subsidiary Bodies to complete action plans as soon as possible, giving due attention to development of TEMA components and formulation of projects for extra-budgetary assistance.

300 The Executive Council adopted Resolution EC-XXV.10.

### 13. ARRANGEMENTS FOR THE TWENTY-SIXTH SESSION OF THE EXECUTIVE COUNCIL AND THE SEVENTEENTH SESSION OF THE ASSEMBLY

301 The Executive Council decided that its Twenty-sixth Session should be convened in Paris, 23-24 February 1993, with 24 February being open to all Member States and be devoted to preliminary discussion of the report of the Study of IOC Development, Operations, Structure and Statutes, so as to facilitate the debate at the Assembly of the Item.

302 The Executive Council also agreed, in concurrence with the Assembly, that the Seventeenth Session of the Assembly be held in Paris in the period, 25 February to 12 March 1993, with the possibility of shortening the Session to 10 March.

303 The Chairman informed the Executive Council that several consultations had been held on the theme of the Anton Bruun Memorial Lectures, taking into account the possible themes considered by the Assembly at its Sixteenth Session (Document SC/MD/97, para.476).

304 Several Delegates provided further ideas on the Bruun Memorial Lectures, including: a review of the climate change problem; the application of scientific results for development and transfer of technology; the first results of an ocean-basin-wide acoustic tomography experiment; the possibility of having a presentation of outcome of UNCED in form of a review, by a notable UNCED personality.

305       The Chairman concluded that an overall theme could include the role of marine research, systematic ocean observations, and related capability-building and technology transfer as a fact-finding basis for ocean management vis-a-vis development and economical cost/benefit aspects, but that all points raised would be taken into account, together with the suggestions made by the Assembly.

306       The Delegate of Portugal recalled an invitation addressed by his Government to IOC during the Sixteenth Session of the Assembly, to host an international conference during 1994 on the theme of marine scientific research, ocean services and related aspects, and requested that plans for such an important meeting be started soon and a progress report submitted to the Seventeenth Session of the Assembly.

#### **14.     ADOPTION OF THE SUMMARY REPORT AND CLOSURE**

307       **The Executive Council adopted the Resolutions and the Report of the Session unanimously and with acclamation.**

308       The Chairman, in closing the Session, remarked on the very positive spirit which had prevailed throughout. He thanked all the Delegations for this, and for their active participation. He also thanked the Secretariat, the teams under Mme. J. Dombret for the technical preparation of the resolutions and report, the translators and interpreters, and the clerks.

309       The Delegate of Brazil, on behalf of the Executive Council, expressed his thanks to the Chairman for the conduct of the Session. The Chairman closed the Session at 10.00 on 18 March 1992.

**ANNEX I****AGENDA**

- 1. OPENING**
- 2. ADMINISTRATIVE ARRANGEMENTS**
  - 2.1 ADOPTION OF THE AGENDA
  - 2.2 DESIGNATION OF THE RAPPORTEUR
  - 2.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION
- 3. REPORT OF THE SECRETARY ON INTERSESSIONAL ACTIVITIES**
- 4. PROGRAMME AND BUDGET**
  - 4.1 STATUS REPORT AND IMPLICATIONS OF THE UNESCO 26th GENERAL CONFERENCE
  - 4.2 POSSIBLE IOC ASSEMBLY SESSIONAL COMMITTEE TO DEAL WITH THE PROGRAMME AND BUDGET
  - 4.3 FOURTH UNESCO MEDIUM-TERM PLAN (1996-2001): PRELIMINARY CONSIDERATIONS
- 5. PROGRAMME MATTERS REQUIRING DECISION BY THE EXECUTIVE COUNCIL**
  - 5.1 OCEAN SCIENCE IN RELATION TO LIVING RESOURCES
  - 5.2 OCEAN SCIENCE IN RELATION TO NON-LIVING RESOURCES
  - 5.3 GLOBAL INVESTIGATION OF POLLUTION IN THE MARINE ENVIRONMENT
  - 5.4 OCEAN DYNAMICS AND CLIMATE
  - 5.5 GLOBAL OCEAN OBSERVING SYSTEM AND GLOBAL CLIMATE OBSERVING SYSTEM
  - 5.6 INTEGRATED GLOBAL OCEAN SERVICES SYSTEM
  - 5.7 INTERNATIONAL TSUNAMI WARNING SYSTEM IN THE PACIFIC
  - 5.8 CO-ORDINATION OF COASTAL ZONE PROGRAMME ACTIVITIES
- 6. TRAINING, EDUCATION AND MUTUAL ASSISTANCE IN MARINE SCIENCES**
- 7. DEVELOPMENT OF REGIONAL PROGRAMMES**
- 8. PREPARATIONS FOR THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT 1992, AND THE IMPLICATIONS OF THE UN CONVENTION ON THE LAW OF THE SEA**
- 9. NEGOTIATIONS FOR A FRAMEWORK CONVENTION ON CLIMATE CHANGE**

**10. CO-OPERATION**

- 10.1 THE ICSPRO AGENCIES AND IAEA AND UNEP**
- 10.2 THE STUDY OF LEGAL ASPECTS OF OCEAN DATA ACQUISITION SYSTEMS**
- 10.3 THE SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH**
- 10.4 OTHER BODIES**

**11. STUDY OF IOC DEVELOPMENT, OPERATIONS, STRUCTURE AND STATUTES**

**12. ADJUSTMENTS TO THE PROGRAMME AND BUDGET FOR 1992-1993 FOR SUB-PROGRAMME II.2.4**

**13. ARRANGEMENTS FOR THE TWENTY-SIXTH SESSION OF THE EXECUTIVE COUNCIL AND THE SEVENTEENTH SESSION OF THE ASSEMBLY**

**14. ADOPTION OF THE SUMMARY REPORT AND CLOSURE**

ANNEX II

RESOLUTIONS

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5	5.7	Thirteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific (ITSU)	8
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**Resolution EC-XXV.1**

**SUPPORT TO THE IOC OCEAN MAPPING PROGRAMME**

The Executive Council,

**Recognizing** that the IOC Ocean Mapping Programme is one of the most successful programmes of the IOC and provides many benefits for developing as well as developed countries,

**Noting** with satisfaction the strong support given by the Member States and the active co-operation of other intergovernmental organizations, such as IHO, ICES, and international regional bodies interested in the activities of the Commission in this field,

**Recalling with appreciation** that for the last few years secretariat support to the implementation of the Programme has been provided by two experts seconded from one of the IOC Member States,

**Noting with concern** that the secondment of these experts may be terminated from April 1992,

**Realizing** that the procedure of opening a new post may take some time to implement and may not be possible before the 1994-95 biennium,

**Urges** Member States to consider seconding staff to the IOC Secretariat to work on the Ocean Mapping Programme implementation;

**Requests** the Chairman IOC to explore with the Executive Heads of appropriate intergovernmental organizations, co-operating with IOC in the Ocean Mapping Programme, to contribute in sharing the expenses for the implementation of this Programme, including staff support.

**Resolution EC-XXV.2**

**ENHANCEMENT OF IOC-UNEP CO-OPERATION ON THE IMPLEMENTATION  
OF GIPME AT GLOBAL AND REGIONAL LEVELS**

The Executive Council,

**Having reviewed** the status of on-going and planned activities of IOC and UNEP's Oceans and Coastal Areas Programme related to GIPME-MARPOLMON at both global and regional levels, including the activities of the relevant IOC regional subsidiary bodies and of UNEP's Regional Seas Action Plans,

**Noting** the progress achieved through the co-operation of IOC and UNEP in accordance with the spirit of the Memorandum of Agreement of August 1987, particularly with regard to the development of the scientific basis and methodologies for the marine pollution monitoring programmes and assessment of IOC and UNEP,

**Realizing** however that the implementation of some of the regional components of both MARPOLMON and the Regional Seas Monitoring Programme, despite all efforts, still requires further development in order to respond effectively and on a regular basis to regional needs for pollution prevention, and the protection and management of the marine environment and coastal areas,

**Being aware** that the success of marine pollution monitoring research and control activities in a region depends largely on the proper consideration of the nature and conditions of the marine environment of the region as well as socio-economic conditions, priorities for environmental protection and capabilities and needs of the national institutes in the region,

**Conscious** of the importance of the protection of oceans and all kinds of seas as envisaged under Agenda 21 of the United Nations Conference on Environment and Development (UNCED),

**Decides**, subject to agreement by UNEP, to undertake practical steps towards better use of experience, skills and resources with a view to progressively developing an operational integrated marine pollution monitoring assessment and control system based on MARPOLMON and the Regional Seas Programme that will adequately respond to the needs of Member States of both organizations and the international community;

**Further decides** to promote early integration of the regional bodies of IOC and UNEP in those cases where the geographical boundaries are essentially common (e.g., in the Caribbean) and to undertake consultation among appropriate regional bodies in cases of mutual interest and geographical overlap (e.g., Western Pacific/East Asian Seas, and Western and Central Indian Ocean) to provide greater harmonization of regional activities. The objectives of these initiatives are to establish, in as timely and effective a manner as possible, joint regional mechanisms for promoting the development of integrated marine pollution monitoring, assessment and control systems within the IOC-UNEP/GIPME Programme that constitute primary components of the GEMS/Earthwatch System;

**Instructs** the Secretary to maintain liaison with multilateral marine pollution programmes lying outside the framework of IOC-UNEP/GIPME, in order to ensure that the results of such programmes are considered in global and regional marine pollution assessments and that advantage is taken of opportunities for obtaining broader global coverage in marine pollution activities. To this end, the Secretary should endeavor to co-ordinate consultations with UNEP, ICES, PICES, the various regional marine environmental protection commissions (e.g., the Helsinki, Oslo and Paris Commissions) and other relevant multilateral initiatives and activities.

**Requests** the Panel to undertake in the intersessional period an in-depth review of mechanisms of the implementation of the scientific, management and control components of the activities of the IOC and UNEP's Regional Seas Programme with a view to making concrete proposals to their respective Governing Bodies concerning the harmonization of structures and procedures of both programmes, so as to ensure the compatibility of the regional components with global monitoring requirements, namely in the framework of GEMS/Earthwatch and GOOS;

**Further requests** the Panel to explore possible avenues of support for the capacity building within/among developing Member States and the regional organizations participating in GIPME through available funding mechanisms such as the Global Environment Facility (GEF) and the European Community.

### **Resolution EC-XXV.3**

#### **INTERNATIONAL MECHANISMS FOR GOOS DEVELOPMENT**

The Executive Council,

**Considering** the requirements to plan and develop a Global Ocean Observing System and co-ordinate this planning with other relevant bodies,

**Recognizing** the need for commitments from Member States for implementation of a comprehensive, long-term Global Ocean Observing System that can only be obtained through national services and facilities,

**Acknowledging** the establishment of the WMO-IOC Intergovernmental TOGA Board and the IOC-WMO Intergovernmental WOCE Panel, and the desirability to further rationalize procedures and channels for reporting,

**Recognizing further** that the climate module of GOOS provides for the ocean component of the Global Climate Observing System,

**Decides** that the Committee on Ocean Processes and Climate be replaced by the IOC Committee for GOOS to serve as the intergovernmental forum for the Global Ocean Observing System;

**Further decides** that the new Committee will, in its initial phase, have the following Terms of Reference:

The IOC Committee for GOOS will:

- (i) be responsible for promotion, co-ordination, implementation and management of the Global Ocean Observing System (GOOS);
- (ii) identify the resources needed for GOOS and the means for obtaining them;
- (iii) develop and update plans for, initiate implementation stages and monitor the progress of GOOS;
- (iv) develop such plans on the advice of the GOOS Technical and Scientific Advisory Panel and other scientific and technical groups as appropriate;
- (v) maintain liaison with related research projects as input to the design of GOOS and to help GOOS respond to research needs;
- (vi) be responsible for the representation of GOOS at meetings of other bodies;

**Invites** the IOC Committee for GOOS to consider as its initial tasks those listed in Annex 1;

**Also invites** Member States to designate representatives to the Committee and **encourages** them to include in their delegations those who are responsible for national contributions to GOOS;

**Further invites** WMO and UNEP, as well as other interested international organizations to participate;

**Decides also** that a GOOS Technical and Scientific Advisory Panel with the following Terms of Reference should be established and **instructs** the Secretary to undertake negotiations with ICSU and SCOR, and other appropriate scientific and technical bodies to facilitate the establishment of the Panel:

The GOOS Technical and Scientific Advisory Panel will:

- (i) advise the IOC Committee for GOOS on all scientific and technical aspects of GOOS, including the plans for various aspects of GOOS;
- (ii) collaborate with the Joint WMO-IOC-ICSU Scientific and Technical Committee for GCOS and other appropriate bodies.

**Further decides** that membership of the Panel will consist of approximately 12 experts, and will take into account the global nature of the work;

**Invites** the GOOS Technical and Scientific Advisory Panel to consider as the initial tasks of the Panel those listed in Annex 2;

**Further decides** that the Intergovernmental WOCE Panel shall henceforth report directly to the IOC governing bodies.

#### **Annex 1 to Resolution EC-XXV.3**

##### **IOC Committee for GOOS Initial Tasks**

- (i) Assess user requirements;
- (ii) Prepare the revised development plan for GOOS, which may include proposals for pilot activities in a gradual fashion in keeping with the priorities which have been identified;
- (iii) Develop a strategy for introducing new observing technology into GOOS;



- (iv) Develop a strategy for providing training and technical assistance within the TEMA framework;
- (v) Establish effective liaison with the relevant GCOS bodies recognizing that the climate module of GOOS provides for the ocean component of GCOS;
- (vi) Develop effective working relations with relevant bodies of other UN organizations such as WMO, UNEP and FAO, with other intergovernmental and regional bodies such as ICES and non-governmental bodies, notably ICSU and its SCOR;
- (vii) Develop effective interactions with the bodies responsible for the various existing programmes and activities such as IGOSS, IODE, DBCP, GLOSS and GIPME MARPOLMON;
- (viii) Work out a strategy for GOOS with respect to the requirements of research projects co-sponsored by IOC.

#### **Annex 2 to Resolution EC-XXV.3**

##### **GOOS Technical and Scientific Advisory Panel Initial Tasks**

- (i) Prepare a list of deliverables expected from GOOS at each stage of its development;
- (ii) Develop a specification for GOOS to meet these deliverables;
- (iii) Develop the scientific basis for that specification;
- (iv) Develop a plan for technical aspects of GOOS including the introduction of new technology;
- (v) Develop a review procedure for assessing the extent to which GOOS achieves its design objectives;
- (vi) Consider the establishment of a scientific and technical subgroup to define the rationale, criteria, scope, and initial elements of the coastal module of GOOS. This subgroup would be similar in purpose to the Ocean Observing System Development Panel which has been charged with developing the conceptual design of the climate aspects of GOOS. The coastal subgroup should examine the needs for globally consistent coastal ocean observations relative to all aspects of global and regional change including sea-level change, global warming, and other anthropogenic effects. This subgroup would report to the GOOS Technical and Scientific Advisory Panel.

#### **Resolution EC-XXV.4**

##### **SIXTH SESSION OF THE JOINT IOC-WMO COMMITTEE FOR THE INTEGRATED GLOBAL OCEAN SERVICES SYSTEM (IGOSS)**

The Executive Council,

Having considered the Final Report of the Sixth Session of the Joint IOC-WMO Committee for IGOSS together with the 7 Resolutions and 8 Recommendations adopted at the Session,

Takes note of the Report and endorses the Resolutions;

Decides to take the following action on the recommendations:

**Recommendation 1 (JC-IGOSS-VI) - Ocean Remote Sensing for IGOSS**

- (i) Approves the Recommendation;
- (ii) Agrees to co-sponsor the Technical Conference on Space-based Ocean Observation, to be held in Bergen, Norway, in September 1993;
- (iii) Instructs the Secretary to provide, within the available financial resources, support for:
  - (a) appropriate education and training activities in the field of ocean remote sensing;
  - (b) the afore-mentioned Conference.

**Recommendation 2 (JC-IGOSS-VI) - XBT Fall Rate Equation**

- (i) Approves the Recommendation;
- (ii) Instructs the Secretary to bring the Recommendation to the attention of all concerned and to support the follow-up actions, as proposed.

**Recommendation 3 (JC-IGOSS-VI) - IGOSS Sub-surface Thermal Structure Programme (ISTP)**

- (i) Approves the Recommendation;
- (ii) Instructs the Secretary to bring the Recommendation to the attention of all concerned;
- (iii) Urges the USA to maintain and support the operation of the Joint Environmental Data Analysis (JEDA) Centre as a Specialized Oceanographic Centre for the ISTP;
- (iv) Further urges Member States to continue and expand their participation in this programme.

**Recommendation 4 (JC-IGOSS-VI) - IGOSS Pilot Project on Altimetric Sea-surface Topography Data (IPAST)**

- (i) Approves the Recommendation;
- (ii) Urges the USA to consider the preparation of a global product on sea-surface topography, derived from satellite altimeter measurements.

**Recommendation 5 (JC-IGOSS-VI) - IGOSS Products Bulletin**

- (i) Approves the Recommendation;
- (ii) Expresses its appreciation to Météo-France for having accepted to publish the first 6 issues of the Bulletin;
- (iii) Instructs the Secretary to seek and co-ordinate assistance by Member States to ensure continuity of publishing of the IGOSS Products Bulletin.

**Recommendation 6 (JC-IGOSS-VI) - The IGOSS Flexible Code**

- (i) Approves the Recommendation;
- (ii) Invites WMO to take the necessary measures to eventually adopt the Code.

**Recommendation 7 (JC-IGOSS-VI) - Global Ocean and Climate Observing Systems Development**

- (i) Notes the Recommendation;
- (ii) Further notes the institutional arrangements which have already been put in place for GOOS and GCOS;
- (iii) Acknowledges that IGOSS has a big role to play in the collection and management of operational oceanographic data within GOOS;
- (iv) Agrees that the exact institutional relationship of IGOSS to GOOS should be determined in the context of the evolution of GOOS and in consultation with WMO;
- (v) Instructs the Secretary to pursue this issue during the intersessional period, in consultation with the Chairman of the IOC GOOS Committee and of the Joint IOC-WMO Committee for IGOSS and prepare proposals for the consideration of IOC-XVII.

**Recommendation 8 (JC-IGOSS-VI) - Review of Previous Resolutions of the IOC and WMO Governing Bodies Relevant to the Field of Activity of the Joint IOC-WMO Committee for IGOSS**

**Decides to postpone action on the Recommendation until IOC is actually engaged in reviewing the state of implementation of previous IOC resolutions.**

**Resolution EC-XXV.5**

**THIRTEENTH SESSION OF THE INTERNATIONAL CO-ORDINATION GROUP  
FOR THE TSUNAMI WARNING SYSTEM IN THE PACIFIC**

The Executive Council,

**Having considered the Summary Report and Recommendations of the Thirteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU), Ensenada, Baja California, Mexico, 10-13 September 1991,**

**Appreciating the progress made by the Group in the advancement of the ITSU programme in the areas of: further development of a Pacific Rapid Response System utilizing real-time transmission of seismic data; public education and awareness; and jointly with the IUGG Tsunami Commission in the development of the project on the Tsunami Inundation Modelling Exchange (TIME) for the Tsunami Disaster Mitigation,**

**Acknowledging the efforts made by the Chairman of the ICG/ITSU and the Secretary IOC in endeavouring to obtain support from the UNDP on the development of a project for the Sub-Regional Tsunami Warning Centre in the Southwest Pacific,**

**Noting with appreciation that UNDP is prepared to make available one-fourth of the funds for the implementation of the project provided three-fourths of the funding for the Sub-Regional System will be given by other sources,**

**Noting the importance of the IOC Tsunami Programme for the safety of life and property, and its relevance to the objectives of the UN International Decade on Natural Disaster Reduction (IDNDR) in which UNESCO is playing a leading role,**

**Emphasizing that the activities of the IOC Tsunami Programme constitute a major component of the IOC contribution to the IDNDR, and that there is a need to maintain the momentum of the programmes that contribute to the IDNDR,**

**Accepts the Summary Report and approves the Recommendations of the Thirteenth Session of the ICG/ITSU;**

**Instructs the Secretary IOC to spare no efforts to help to ensure the necessary financial support for the implementation of the ITSU projects in accordance with the priorities identified in Recommendation ITSU-XIII.4;**

**Requests the Chairman, with the assistance of the Secretary, to bring to the attention of the Director-General of UNESCO and other relevant UN bodies, the activities of ICG/ITSU as an IOC contribution to the IDNDR, with a view to seeking additional resources from UNESCO and from other UN bodies for these activities;**

**Expresses concern that funds allocated under the UNESCO regular budget for 1992-1993 biennium are insufficient to implement adequately the assigned responsibilities and agreed-upon activities;**

**Urges Member States to increase their efforts to provide adequate funding for the support of the IOC Tsunami Programme and of the Sub-Regional Tsunami Warning System in the Southwest Pacific, by providing financial contributions and/or by bilateral/multilateral assistance to other Member States that have a need for Tsunami Hazard Preparedness and Tsunami Hazard Reduction, and by contacting relevant donor agencies expressing their support for the projects proposals made as a national priority.**

**Resolution EC-XXV.6**

**TEMA ACTIVITIES**

The Executive Council,

**Acknowledging** that TEMA activities constitute a key component of all IOC activities,

**Considering** that the TEMA Programme has reached a new stage since the Sixteenth Session of the IOC Assembly when the Action Plan for TEMA was adopted, and in the perspective of the follow-up of UNCED,

**Being aware** that TEMA requires intensive efforts so as to maintain an effective basis for present and future activities,

**Considering** it essential to promote existing Institutes and Programmes in post-graduate marine science in developing countries,

**Requests** the Chairman of TEMA and the Secretary of IOC, to activate the implementation of the "UNESCO/IOC Comprehensive Plan for a Major Programme to Enhance the Marine Science Capabilities of Developing Countries" through regional/sub-regional assistance projects and the mobilization of extra-budgetary funds to that effect, with the support of Member States, and to report on the progress to the Seventeenth Session of the IOC Assembly;

**Requests** the Director-General to accelerate the appointment of the P-5 to be in charge of TEMA;

**Instructs** the IOC Group of Experts on Marine Information Management (MIM), to advise the Secretary on ways by which a database on postgraduate programmes of marine institutions in developing countries can be developed and rapidly disseminated, in both machine-readable and printed formats, taking into account long-term plans to update the International Directory of Marine Scientists and Institutions;

**Reaffirms** that a special effort should be made to ensure that TEMA components are included as an integral part of the IOC programmes and activities in conformity with the high priority which has been given to the Programme by the IOC Assembly and that budgetary allocations be made accordingly.

**Resolution EC-XXV.7**

**REGIONAL ORGANIZATION FOR THE PROTECTION OF THE MARINE ENVIRONMENT  
(ROPME)**

The Executive Council,

**Welcoming** the Resolution of the 3rd Special Session of UNEP's Governing Council (UNEP/GCSS III/L7-II) on the State of the Environment and Resolution XVI-14 of the Sixteenth Session of the IOC Assembly on the Oceanographic Co-operation with the ROPME Sea Area,

**Being aware** of the contents of the ROPME-IOC Integrated Project Plan (IPP) which is the coastal/marine component of the ROPME/UNEP Consolidated Rehabilitation Programme (CRP),

**Stressing the importance** of the long-term research, monitoring, restoration and rehabilitation aspects of the CRP,

**Noting** that the resources required to implement the Plan are far beyond the present capabilities of the region,

**Recognizing** the unique ecological importance and fragility of the ROPME Sea Area,

**Decides** that IOC accepts and recommends to ROPME also to accept a longer-term programme beyond the two years of the IPP;

**Decides** to provide technical support through the GIPME Group of Experts to the on-going activities, including verification of results after each stage of implementation, as well as to the development of the longer-term programme;

**Urges** that the resources necessary should be identified to augment the on-going regional and international efforts for implementation of the plan as soon as possible;

**Endorses** the proposed conference to be convened in the Islamic Republic of Iran in the third quarter of 1993 by IOC in close co-operation with ROPME, UNEP and governments in the region. This conference will allow for an evaluation of the progress in the implementation of the IPP in light of data emanating from the first 18 months and permit focussing on longer-term impact assessment and rehabilitation aspects of the CRP.

#### **Resolution EC-XXV.8**

#### **IOC PARTICIPATION IN UNCED**

The Executive Council,

**Recalling** Resolution XVI-16 on the Preparation for the 1992 United Nations Conference on Environment and Development (UNCED) and the contributions that IOC has made to the preparatory phase,

**Reliterating** the importance of taking full advantage of the UNCED process to enhance awareness of the role of the ocean in the global environment and of the importance of ocean resources,

**Stressing** the importance of the forthcoming UNCED for sustainable development and for a healthy environment, and the very specific and important role of the world ocean to this end,

**Recognizing** the leading role of IOC in research and systematic observations of the oceans, shelf seas, the coastal zone, enclosed and semi-enclosed seas and related capability building,

**Urges** the Member States of IOC to fully inform their delegations to UNCED of the willingness and capabilities of the Commission to undertake the implementation of UNCED decisions related to the marine and coastal environments;

**Further urges** Member States of IOC to contact directly the Secretary-General for UNCED and the relevant department in UN Headquarters with the request that the IOC be invited to participate in UNCED in its own right, as was the case of UNCLOS;

**Requests** the Chairman and the Secretary to take all necessary steps to ensure that IOC be represented at UNCED in its own right and capacity.

#### **Resolution EC-XXV.9**

#### **IMPLICATIONS FOR IOC OF THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA**

The Executive Council,

**Being aware** of the role in ocean sciences and services that the IOC is called upon to perform in regard to current developments such as the planning and implementation of global change research programmes as well as management and protection of the marine environment and its resources,

**Taking into consideration** the special status and responsibilities conferred to IOC by the United Nations Convention on the Law of the Sea as a "competent international organization", as recognized by Assembly Resolution XVI-19, determining the Terms of Reference of the *ad hoc* Study Group on Development, Operation, Structure and Statutes,

**Acknowledging** the need for consideration of the wide range of possible implications of the entry into force of the United Nations Convention of the Law of the Sea to the Statutes and activities of IOC,

**Recalling** the work of the IOC *ad hoc* Task Team to study the implications, for the Commission, of the UN Convention on the Law of the Sea and the New Ocean Regime (LOSI),

**Underlines** the importance of the functions to be assumed by the IOC, under The United Nations Convention on the Law of the Sea (UNCLOS), particularly in regard to marine scientific research, in assistance to the Commission on the Limits of the Continental Shelf according to Annex II, Article 3, of the Convention, as well as in the settlement of disputes concerning the application of the Convention according to its Annex VIII, Article 2;

**Requests** that the *ad hoc* Study Group on IOC Development, Operation, Structures and Statutes advises on the procedures to be followed for the up-dating of the report of the *ad hoc* Task Team on LOSI.

#### **Resolution EC-XXV.10**

#### **IOC PROGRAMME AND BUDGET**

The Executive Council,

**Recalling** IOC Resolution XVI-17 by which the Assembly approved the Proposal on the IOC Programme and Budget for 1992-93 as a minimal basis for future planning,

**Taking note** of the decisions of the 26th UNESCO General Conference and in regard to Sub-programme II.2.4 on the Intergovernmental Oceanographic Commission (IOC) and Marine Science Related Issues,

**Reliterating** the need for more formal arrangements by which IOC Member States either through the IOC Trust Fund or other means, can provide increased resources in a stable and continuing manner,

**Recognizing** that the need to ensure adequate resources for the IOC is a shared responsibility between UNESCO and the Member States of the Commission,

**Further recognizing** the importance of the contribution of the Commission's regional bodies in establishing requirements and priorities in marine science, and service programmes including their TEMA components,

**Invites** Member States to consider ways by which they could make more formal commitments to the IOC in regard to both funding and staff;

**Calls** on both potential donor and recipient Member States to support IOC negotiation with major funding sources and bring to their attention in a timely manner national endorsement of proposed projects, including those developed by IOC regional bodies;

**Requests** IOC regional bodies to prepare suitable projects, based upon their priority programmes, for submission to funding agencies;

**Instructs** the Secretary to continue active negotiation with major extra-budgetary funding sources, such as those available through the Global Environmental Facility and the European Economic Community, as well as through bilateral and multilateral arrangements, with a view to presenting specific projects for support.

#### **I**

#### **With regard to the 1992-1993 Programme and Budget**

**Emphasizing** that the additional resources required for satisfactory implementation of all IOC programmes, as indicated in the Action Paper (Document IOC/EC-XXV/8), imply more than a doubling of funding over the present biennium compared with that now available,

**Appeals to Member States**, as a matter of urgency during the 1992-93 biennium, to mobilize funding for programme implementation and support of staff positions through contributions to the IOC Trust Fund and provision of seconded staff;

**Invites** the Director-General of UNESCO to consider IOC needs, especially requirements to hire the necessary expertise for *inter alia* the Ocean Mapping Programme, as a high priority when decisions are made regarding the use of 'reserve funding' during 1992-1993, and that any resources thus made available should be placed under the management of the Secretary IOC;

**Expresses its appreciation** to the Director-General for his decision to announce two P-5 positions (for TEMA and GOOS) and requests that the recruitment procedures for these posts be accelerated;

**Authorizes** the Secretary to implement the programme in the light of available resources and the guidance provided by the Executive Council, in consultation with the Chairman and Vice-Chairmen.

## **II**

### **With regard to the 1994-1995 Programme and Budget**

**Having been informed** that UNESCO is already developing a framework for the 1994-1995 biennium and that the views of UNESCO Member States will be sought this year in regard to both the formulation of the programme and areas of emphasis,

**Invites** the Director-General to consider further reinforcement of the integrated programme in the 1994-95 budget in order to more fully meet the marine science and services needs of IOC Member States especially developing countries, at the regional level;

**Also invites** the Director-General of UNESCO to consider opening a new professional post for the co-ordination of the Ocean Mapping Programmes;

**Further invites** the Director-General to transmit this resolution to the 139th and 140th Sessions of the UNESCO Executive Board, so that it can be taken into account under relevant agenda items concerning the UNESCO programme and budget;

**Urges** Member States to contact their national authorities, in particular UNESCO National Commissions, with a view to mobilizing support for the position taken by the IOC that Sub-programme II.2.4 should receive a substantial increase in funding for the 1994-1995 biennium so that it can more effectively respond to the needs of IOC Member States, especially developing countries, at the regional level and particularly in the area of coastal zone programmes.

ANNEX III

ADDRESSES

**A. Opening Address by Professor Manuel M. Murillo  
Chairman of the Intergovernmental Oceanographic Commission**

Distinguished Delegates, Representatives and Observers,  
Ladies and Gentlemen,

Allow me to extend respectful greetings and a cordial welcome to this Twenty-fifth Session of the Executive Council of the Intergovernmental Oceanographic Commission, which will open its deliberations this morning by reviewing the progress made in the implementation of the body of resolutions adopted by the IOC Assembly at its Sixteenth Session, and will then discuss other matters of relevance to the leading concerns of Member States.

Let me take this opportunity to express my gratitude to Mr. Federico Mayor, Director-General of UNESCO, for his receptive and supportive attitude to the search for solutions to the problems that we have placed before him during this intersessional period, and for his pledge to lend full support to IOC's action to ensure that the oceans are given their rightful place in the framework of the United Nations system.

The time is also ripe to mention the importance we attach to the efforts made by the Assistant Director-General for Natural Sciences, Mr. A. Badran, to combine in a single administrative structure for marine science at UNESCO the activities of training, teaching and mutual assistance that are now under the responsibility of the IOC Secretary. It is a matter of concern that we are still in the process of adjusting to that new structure, despite the fact that IOC has taken concrete steps to discharge its responsibility as UNESCO's own co-ordinating body for marine sciences.

Distinguished Delegates,

It is not my intention, in this opening statement, to give an exhaustive account of all the important activities carried out by the Commission, since our timetable of work makes provision for this. However, I should like to draw attention to a number of key subjects which call for the participation, contribution and guidance that you as delegates are in a position to offer. It must be recognized that the programmes have steadily gained strength as they have come more closely to reflect the interests of the Member States. The variety of oceanic services and science programmes adopted by the governing bodies of IOC illustrate the Member States' interest in developing the cognitive base needed for the sustainable use of marine resources and their concern to carry out monitoring activities with a view to a proper evaluation of the principal causal factors at work.

This Session of the Executive Council is taking place at a very significant juncture, barely 3 months away from our appointment in Rio de Janeiro, where the United Nations Conference on Environment and Development (Earth Summit) will make decisions that we expect to have an immediate and decisive influence on the future of humanity.

By their sheer size and energy, the oceans play a fundamental role in the life of the planet; what is more, a substantial and growing proportion of the world's population live directly under their influence in coastal zones. Despite the valuable contributions of the scientific community, more vital information is needed for an adequate understanding of physical and chemical processes, atmospheric interaction, coastal, benthic and abyssal ecological systems and the effects of human activity.

The change in world climate, which is a universal concern, can be understood only if the oceans are taken into consideration. Longer-term weather and climatic forecasts require knowledge of ocean behaviour. There are also grounds for belief that the oceans themselves are changing in response to the variations in global climate that have taken place over the past few centuries. Because of its socio-economic repercussions, the possible prediction of climate change through adequate monitoring is essential to the formulation of policies that take new developments into account.



In recognition of this central role played by the oceans, IOC has taken a major intergovernmental step by setting up a Global Ocean Observing System, which will be required to work closely with the Global Climate Observing System. Regular observations will be made of the principal properties of the ocean, and matters such as climatic predictions, the global rise in sea-level and the problems of the marine and coastal environments of Member States will be taken up. This system has been launched by having recourse to existing intergovernmental programmes and introducing the necessary improvements and adjustments to facilitate new developments and technology transfer.

The endorsement of this action by the Earth Summit will depend largely on efforts by the national delegations to ensure that the oceans are not relegated to a position of lower priority as the Conference unfolds. Accordingly, national delegations to the Earth Summit must, without fail, be adequately informed about the existence of IOC, its role and its achievements.

On the eve of this important Conference, any guidance that the Distinguished Delegates may give us will be very valuable as a contribution to this final stage of the preparatory process, and will enhance the effectiveness of the IOC Delegation to the Earth Summit.

I should like to inform you that in order to round off the measures taken to launch the Global Ocean Observing System and to develop an overall approach to the build-up of the knowledge that we still lack about the way the global climate system works, efforts have been made to achieve full intergovernmental co-ordination of the World Climate Research Programme. To that end, talks have been held with the executive heads of WMO and ICSU for the purpose of finding appropriate ways of bringing that Programme under the co-sponsorship of IOC. A Memorandum of Understanding has already been signed by WMO, ICSU and IOC, laying a strong co-operative foundation for the organization of the Global Climate Observing System.

Another task before the Commission, concerning which the views of the Distinguished Delegates would be of great value, is the need to establish criteria to be used as guidelines in the preparation of that part of UNESCO's Fourth Medium-Term Plan which relates to IOC. In order to do so, consideration must be given, among other things, to the Strategy approved by the Assembly at its last Session and to co-operation and joint programming actions with other bodies.

The discussions on the progress report to be submitted by the Chairman of the DOSS *ad hoc* Study Group (Development, Operations, Structure and Statutes) will undoubtedly be a useful source of inspiration for the work of the Secretariat.

It is important when discussing this Agenda Item that the Delegates take into consideration the global and regional components of the programmes and ensure that training, teaching and mutual assistance activities are included in each and every one of them, in recognition of the need to promote the training of qualified staff and to strengthen the endogenous capabilities of the developing countries.

Now is the time to acknowledge the substantial support given to IOC by the General Conference of UNESCO at its 26th Session, and likewise the backing we have been honoured to receive from the Director-General and the generous response of the Member States to the initiative of the Delegation of Portugal.

In conclusion, Distinguished Delegates, I am pleased to inform you that last December, at the first meeting of the DOSS *ad hoc* Study Group, we had an opportunity - the first Vice-Chairman, Dr. John Knauss, the Secretary and I - to meet the Director-General, in order to discuss matters of importance to the Commission. One such topic was the critical situation of the Secretariat, and especially the lack of technical staff to supervise the principal programmes. The Director-General gave assurances that the two posts mentioned by the Secretary in his report would be allocated.

Another working meeting with the Director-General took place at San José, Costa Rica, in the second week of February. On that occasion, Dr. Kullenberg and I consulted with the Director-General concerning the participation of IOC in the Earth Summit in its own right.

**B. ROGER REVELLE MEMORIAL LECTURE**  
13 March 1992

**Introductory Remarks**  
**by**  
**Mr. Federico Mayor**  
**Director-General**  
**United Nations Educational, Scientific and Cultural Organization**  
**(UNESCO)**

It is a pleasure and an honour for me to introduce this first lecture in honour of Roger Revelle. I would like to share briefly with you my personal recollections and esteem for a man who was a giant in every sense of the word: physically, mentally and spiritually.

I first met Roger in the late 1970's in connection with UNESCO's research on basic human needs programme, which owed much to his dream of equity in human relationships, based on equal access to education and knowledge. This ideal was indeed reflected in every endeavour he undertook, including the rationale for an intergovernmental body for ocean research that resulted in the establishment of our Commission.

As one of the authors of the Copenhagen Declaration, he stated most clearly in 1960, the importance of the ocean to humanity as a whole and the need to study the ocean from many points of view, and through the concerted action of all nations. His foresight of three decades ago was remarkable. At a time when the ocean was viewed by most as basically a source of food and a medium for transportation, Roger inserted into the Declaration the following:

*"The oceans exert a profound influence on mankind and indeed upon all forms of life on earth. The oceans are inexhaustible sources of water and heat, and control the climate of many parts of the world."*

Reading the other week an account of a recent article in *Nature* on investigations in the North Atlantic Deep Waters highlighting the links between the ocean and climate, I thought immediately of Roger and his visionary approach to everything he undertook.

His intellectual curiosity and commitment to human needs was by no means limited to ocean research itself. A man - an American - with a truly global vision of humanity, he also devoted his energy to world problems such as desertification and possible solutions through the green revolution.

Speaking with Roger on these matters was always a stimulating and rewarding experience. He was a man of dialogue and those who had the privilege of sharing ideas with him found the frontiers of their own minds considerably expanded. I would like to emphasize the solidarity of this great man with the whole world - he, for one, certainly welcomed the expansion of the IOC and its TEMA (Training, Education and Mutual Assistance) commitment to help establish marine science capabilities and sustained ocean observations in support of the development of the Third World.

His commitment to the world community led him some years ago to organize a "think-tank" session at the University of San Diego to explore with others the question of "Restructuring UNESCO" with a view to restoring the universality of the Organization. I was most honoured to receive an invitation from Roger at that time and contribute with him to the proposals that emerged from the meeting. And, only two years ago, he invited me to his house at La Jolla to once again explore the subject, but this time based on the restructuring already accomplished.

When exceptional individuals such as Roger disappear from the world community, they leave behind them a huge gap but also a mission to all of us, as individuals and in our official capacities, to further the goals to which he was committed. We can't all be giants, but each of us can contribute, knowing that his influence will be present in our endeavours.

This is the essential legacy left by Roger Revelle: not only his work as a pioneer in the field of international co-operation in ocean science and as one of the founding fathers of the IOC of UNESCO, but also his implicit call to all of us to promote to the best of our ability the vision of equity and universality that he embodied. It now gives me great pleasure to give the floor to Dr. John Knauss, First Vice-Chairman IOC, to speak to us about Roger Revelle and his contribution to ocean science.

**ROGER REVELLE AND HIS CONTRIBUTION TO  
INTERNATIONAL OCEAN SCIENCE**

**by the Honourable John A. Knauss  
Under-Secretary for Oceans and Atmosphere,  
U.S. Department of Commerce,  
and First Vice-Chairman of IOC**

I am pleased and honoured to be asked to give the first IOC Revelle lecture. My goal in this first Revelle lecture is to leave you with some measure of the man and why so many of us believe it fitting that the IOC establish a Revelle lecture series. As I will attempt to demonstrate, he was as responsible as any single person can be for the establishment of this, our own organization, the Intergovernmental Oceanographic Commission.

He was a visionary, a builder of institutions, a champion of international co-operation, a great scientist and an extraordinary warm and friendly person. He left his mark on many throughout the world.

He certainly left his mark on me. I am an oceanographer because of him. Like many of my generation I emerged from the vastly changed world of World War II, confused and perplexed as to what I wanted to do. I had some training in meteorology and physics, was enamoured of neither, and was casting about for a career when I met Roger Revelle through a mutual friend. He steered me to a temporary position with the Navy in oceanography and 43 years later I am still at it. I eventually went to Scripps, where Revelle was the director, to obtain my PhD and to learn some proper oceanography. I was adopted by the Revelle family and served for a brief period as Roger's assistant in the Director's office. He was my major professor and chaired my PhD Committee. He remained a colleague, friend and adviser until his death this past July at the age of 82.

I give this résumé so that you can judge my bias. In an era of too few heroes, Roger Revelle is one of mine.

Oceanography changed rapidly after World War II, nowhere more so than at Scripps where Revelle had earned his PhD before the War and where he returned afterwards. Prior to World War II, Scripps was a small coastal marine station with very limited seagoing capability. But that was the situation almost everywhere. The major deep ocean programmes we are all so familiar with were, almost without exception, national expeditions - one of a kind expeditions - expeditions that took many years to plan and even more years to reduce findings to paper. They were the CHALLENGER, the METEOR, the DANA expeditions. They were grand, marvelous affairs, and the results were published in the multi-volume expedition reports.

All of that changed rapidly after World War II, and nowhere did it change more rapidly than at Scripps where Revelle was Director. He wanted to expand Scripps' horizons beyond the coastal waters, and, with the help of two 43 meter Navy surplus ocean-going tugs he did just that. The first was a single-ship three-month expedition called the MID PAC in 1950, and the second was a five-month two-ship expedition called CAPRICORN in 1952-53. Both ranged widely over the Pacific. Both were led by Revelle. Since he was the Scripps Director, many thought he should have remained home and be the Director rather than wandering about at sea where it was difficult to communicate with those ashore. Remember that these were the days before voice ship-to-shore radio communications. All messages to and from the ship were by Morse code. Nevertheless, he led both expeditions from beginning to end.

In my view those two expeditions signaled a change in how oceanography was going to be done. Scientists from many disciplines were on each voyage, but no finely bound multi-volume expedition reports resulted. Instead the professional literature (biological, chemical, geological, physical), was filled with results from those programmes for many years thereafter. Major sea-going expeditions were going to become routine, not a once-in-a-lifetime opportunity with special expedition reports. More importantly for those of us at Scripps, it signaled a change in how we looked at our science. There were no longer any unspoken geographical boundaries. Assuming you could find the necessary funding for your programme, you could go wherever it was necessary to attack your problem.

Nor, we soon learned, were we unique. We were not the only institution or the only country sending ships far to sea. Europe was; and so, most dramatically of all, was the USSR. By the time the International Geophysical Year was completed at the end of the 1950's, it was clear that the world of oceanographic research had changed. The era of the multi-volume expedition reports had passed. There were many research ships in many oceans. New and wonderful discoveries were being reported regularly in professional literature. Plans for ever larger and more complex programmes were being discussed.

Was there need for better international co-ordination? Many thought so. The International Geophysical Year of 1957-58 was a tremendous success both scientifically and as a means of developing increasing international co-operation amongst the scientific community. I expect, however, that a close reading of the history of the IGY would show that the oceanographers came a bit late to the party. There was indeed an international oceanographic component to the IGY, and Revelle played a major role in developing it; but, except for the establishment of World Data Centers, it was mostly a loosely co-ordinated effort by a number of groups to develop individual programmes under the IGY banner. Through international planning meetings we got to know each other better, but I believe one would have been hard pressed to argue that the whole of the oceanographic IGY programme was greater than the sum of its parts.

Oceanography badly needed a better means of international co-ordination. Many understood that. What was less clear was how. There were a number of false starts before the IGY. The International Council of Scientific Unions (ICSU) established an International Joint Commission on Oceanography in 1951. Revelle was a member. It recommended the establishment of a Deep Sea Council, but two years later in 1953, ICSU apparently thought the group was going beyond its terms of reference and abolished the Commission. ICSU tried again a year later with the establishment of a Special Committee on Deep Sea Research. Revelle was made a member of that as well. In 1955, UNESCO in a parallel effort, established an International Advisory Committee on Marine Sciences to advise the Director-General on the preparation and execution of UNESCO's marine programmes. Revelle, along with Anton Bruun of Denmark and George Deacon of the UK found themselves members of both committees.

All of this was going on while the International Geophysical Year of 1957-58 was being planned. As the IGY was about to start, the President of ICSU, Lloyd Berkner, suggested to Revelle that a suitable follow-on to the IGY would be an international co-operative programme in oceanography. He then asked Revelle to organize a special committee for that purpose.

I believe Berkner's decision signaled the end of the confusion. From that date one can clearly trace the establishment of SCOR, the Special (later renamed Scientific) Committee for Oceanographic Research, the Intergovernmental Oceanographic Commission and the great joint effort of both organizations in their formative years - the International Indian Ocean Expedition.

SCOR was established in 1957, the year of the IGY. At its first meeting in Woods Hole Roger Revelle was elected Chairman, George Deacon of the UK was Vice-chairman and Gunter Bohnnecke of Germany was Secretary. It was agreed that the principal objective of SCOR should be *"to encourage and co-ordinate an international programme of observations and measurements of deep ocean water."* Also from that first meeting came an agreement to mount a major international oceanographic effort on that most unknown of oceans, the Indian Ocean.

The history of how that expedition developed is told in a charming book published some years ago by The UNESCO Press entitled *"Assault on the Largest Unknown - The International Indian Ocean Expedition"* by Daniel Behrman. As an active participant of that expedition I can vouch for its authenticity.

Once it was clear that there was to be a concerted effort to study the Indian Ocean, ideas flowed quickly. What began as a one-year highly structured programme became a six-year multifaceted effort. The original concept of a systematic survey was lost in the entrepreneurial enthusiasm of many scientists from all over the world.

Revelle, Deacon and Bruun spent the summer of 1960 in Copenhagen pulling together the various components of the International Indian Ocean Expedition (IIOE), into a coherent plan that could be presented to SCOR and to governments. It was not an easy task. Warren Wooster who was the first IOC Secretary has written, *"I think the International Indian Ocean Expedition was the greatest unco-ordinated expedition in oceanographic history. I ought to know. I was co-ordinator part of the time. It was the only way to explore such a region. Scientists with curiosity would not have come in, if it had been done any other way."*

The reason why Wooster was the Indian Ocean co-ordinator was that the IOC took over from SCOR the responsibility of the Indian Ocean Expedition in 1962, and the reason it did so was that Roger Revelle and others realized that there were limits to what a non-governmental organization like SCOR could do.

In July 1960, that same Copenhagen summer that Revelle, Deacon and Bruun were attempting to pull together the various strands of what was to be the International Indian Ocean Expedition, UNESCO held an Intergovernmental Conference on Oceanographic Research in Copenhagen. Roger Revelle led the US Delegation. The Conference recommended the establishment of the Intergovernmental Oceanographic Commission, the IOC; a recommendation that was subsequently approved by the UNESCO General Conference. In 1962, the IOC took over the co-ordination of the International Indian Ocean Expedition with SCOR remaining in an advisory role.

The need for the IOC flowed directly from the plans of SCOR and the Indian Ocean programme. As Revelle and others noted, the aspirations of oceanographers to continue the momentum of the IGY, to carry out the vast international co-operative programmes envisaged for the Indian Ocean, required some form of intergovernmental organization. It could not be left to non-governmental organizations alone. Programmes of this size and complexity often require formal government commitments.

During this period Roger Revelle managed two other projects I would like to note. As President of SCOR, he arranged with the American Association for the Advancement of Science to hold the first International Oceanographic Congress in 1959. He was President of the Conference and with typical Revelle aplomb he managed somehow to have the Congress held in the United Nations Headquarters in New York. I was fortunate to participate in that first Congress, and I still remember my sense of wonder as I watched some of my more senior colleagues delivering their plenary addresses from the same lectern that heads of state had addressed the U.N. General Assembly just a few months previously.

It was also during this period that Roger Revelle and Harry Wexler of the U.S. Weather Bureau agreed to sponsor a young PhD chemist who was convinced that he could make continuous carbon dioxide measurements with a routine accuracy that no one had yet attained. These were the start of what many have referred to as the most important set of environmental measurements of this century, the carbon dioxide observations of the Mauna Loa Observatory in Hawaii which began in 1958 and continue to this day under the same watchful eye of Charles David Keeling.

There had been suggestions for some time that perhaps there was an increase in the carbon dioxide content of the atmosphere as a result of the burning of fossil fuels. Revelle agreed. He had done early research on ocean carbonates and the ocean carbon dioxide cycle. He and Hans Suess published a paper in 1957 in which they predicted that the ocean could not absorb more than 50% of the carbon dioxide released by the current rate of burning of fossil fuels; carbon that had been secreted by the earth for millions of years.

As Revelle noted in one of his oft quoted epigrams, *"we are now carrying out a large scale geophysical experiment of a kind that could not be carried out in the past or be reproduced in the future."*

Keeling quickly justified Revelle's and Wexler's faith. The first results were confusing; the CO<sub>2</sub> level first rose, then fell and often there were gaps in the data because of an inconsistent power supply at that remote mountain side location. But by the end of the second year, however, the pattern was clear. There is a seasonal pattern tied to the plant cycle superimposed on a yearly increase of carbon dioxide of about half a percent a year.

Thus began the set of measurements that have convinced the world that mankind can indeed have a global effect on climate. The now familiar saw tooth curve of carbon dioxide which shows about half a percent per year increase in carbon dioxide now graces every report pertaining to global warming. One may argue about how much warming will take place and how fast it will take place because of the slow but inexorable climb in CO<sub>2</sub> concentrations, but there is no argument about the data.

In 1964, Roger Revelle took an 11 year leave of absence from oceanography when he left the University of California at San Diego to establish the Harvard University Center for Population Studies. He returned in 1975 at the time of his Harvard retirement.

His enthusiasm for international science never flagged. He strongly supported the internationalization of the Ocean Drilling Programme which had begun as a US programme. He continued to serve, and often lead international programmes. He was the first Chairman of the United States Committee for the International Biological Programme. He served as a US Delegate to the UNESCO General Conference on 4 occasions and to the General Assemblies of ICSU for 22 years. He served as an adviser to the governments of India, Pakistan, Bangladesh, Nepal and Sri Lanka.

In 1979, Roger Revelle returned to the IOC he had helped to form. He came as Chairman of a new Joint SCOR-IOC Committee on Climate Change and the Ocean, the CCCO. His 1979 address on climate to the Eleventh IOC Assembly was a typical Revelle tour de force. He began with the words, "I am about to describe what I believe to be the most important programme that has challenged the IOC in many years." He then proceeded to strip a very complex subject to its essence without trivializing it, having something to say to the expert as well as to the layman. He evoked the excitement of the present scientific studies and plans for the future. He held out hope of the extraordinary social and economic benefits that would result if we could indeed predict the strength and timing of the Indian Monsoon, the East Pacific El Niño, or the yearly rainfall in Russia or Northern Africa. Most importantly for his IOC audience, he demonstrated the role of the ocean in climate variability.

He finished with these words, *"In concluding, let me say that there are two important aspects of the world climate problem. One is statistics, that is the average conditions and variance. And the second is the possibility of actually forecasting climate. We cannot forecast it now; we may never be able to forecast it, but if we could, the results would be so valuable that the gamble is worth taking. And I conclude by emphasizing what I have said in the beginning, that the World Climate Programme and the possible role of the IOC in that programme represents the greatest challenge and the greatest responsibility that this body in my experience has ever had."*

Roger Revelle was largely responsible for the formation of SCOR, the International Indian Ocean Expedition and the IOC. An IOC whose major effort during its first 15 years was the facilitation of ocean science. I find it interesting that Revelle should have resurfaced at IOC in 1979, some 18 years after the 1961 meeting, to sound the call for a new challenge for IOC, the development of the necessary programmes that will allow us to monitor and perhaps to predict climate variability.

We have made progress in meeting the challenge that Revelle laid before us in 1979, but we have much more to do. That task is more important now than it was a dozen years ago. Revelle was properly cautious in not claiming that we would be able to forecast climate variability. He only held out the promise that if we could, the rewards would be great and therefore the risk was worth taking.

We are increasingly confident that we will succeed. Our understanding of the tropical Pacific Southern Oscillation is sufficient that we are already having some success in forecasting El Niño events. Most believe it is only a matter of time before other climate forecasts will be possible.

All such forecasts, however, require better monitoring of the ocean. We must develop a global ocean observing system comparable to the international weather observing system.

In conclusion, I hope that whoever gives the Revelle lecture in the year 2000 can look back at the IOC and note that Roger Revelle's call in 1979 for the IOC to address climate variability was as important in shaping the IOC of the year 2000, as was his insistence in 1960 that there be an intergovernmental body such as IOC to facilitate international marine science.

**C. Report on Intersessional Activities 1991: Highlights  
by Gunnar Kullenberg, Secretary IOC**

In this brief overview I am referring, in particular to the Resolutions adopted by the Assembly at its Sixteenth Session. The agreement for the IOC co-sponsorship of the World Climate Research Programme with WMO and ICSU has been negotiated. It requires that the Commission provide financial support, and that the IOC Governing Bodies can provide the leadership and input required for the active participation of the oceanographic community in the programme.

A Memorandum of Understanding on joint development and support to the Global Climate Observing System has been signed by WMO, IOC, ICSU and UNEP. All these organizations have also expressed their support for the development of GOOS. The GOOS is included in the proposed UNCED-Agenda 21. The Global Ocean Observing System development is proceeding. The Director-General of UNESCO has indicated provision of a new post (P-5) as head of the GOOS Planning Staff, to be announced shortly. A draft GOOS plan was discussed by the Fifth Session of the Committee on Ocean Processes and Climate, and is also before you. I would like to emphasize that additional resources must come forward for the development of GOOS, GCOS and WCRP, to the national IOC efforts as well as to the international efforts through the IOC Secretariat. We all have a great responsibility in achieving this.

During the UNCED process, the coastal zone and its development and management has been in focus. The Commission has supported the preparation of a book on this subject by Prof. E. Goldberg of Scripps. We expect to publish the book in UNESCO Press this year. The role of the fact-finding machinery and related procedures established by the IOC - research and systematic observations and capacity building - plays an important role in the Integrated Coastal Zone Management. It is necessary for IOC to acknowledge that and shoulder the responsibility.

The co-ordination of coastal zone programmes and activities is considered an important element in the Joint IOC-UNEP document on "Strategies for the Protection and Development of the Oceans and Coastal Areas" (Document IOC/EC-XXV/8, Annex 2). This document, together with the 26 C/5 Approved and the related resolution of the 26th General Conference of UNESCO, represents the present response of the Secretariat to Resolution XVI-11: Co-ordination of coastal-zone programmes and activities.

There is a need to strengthen the integration of the programmes in this area, as well as the co-operation with those of other organizations. There is also a need for Member States to commit themselves and accept the responsibility of taking on coastal and shelf seas oceanography for management and development. It should be noted that the co-operation between IOC and the Swedish SAREC, through which SAREC provides considerable funds to IOC actions in Africa and the Caribbean, is based on the objective of developing such coastal zone research for the support of management and rational development and use of the coastal zone and its resources. The establishment and co-ordination of systematic observations on a scientific basis as a premise for targeted and well-founded management must be supported, and this requires commitment on a national basis by Governments. It cannot be achieved through a more or less personal voluntary network of marine scientists or institutions. The IOC must make use of its machinery and procedures in this case. Hence, the joint development of the coastal ocean observing system by IOC, UNEP, WMO and IUCN. The COMAR programme should co-ordinate with this initiative but cannot substitute it.

Very considerable efforts have gone into the establishment of oceanographic plans, and helping to initiate them, in the ROPME area. The IOC-ROPME-NOAA cruise of the RV MOUNT MITCHELL in the region is the result of these combined efforts.

The Secretariat and IOC officers have actively participated in the preparations for UNCED, and in the negotiations for a Framework Convention on Climate Change. It is necessary for the IOC to help ensure that marine research and systematic ocean observations are included as parts of the Agenda presently and for the future. We need a dialogue with many other parts of society in this case - the users, the implementers, the legislators, and the producers. The IOC has an excellent base for achieving this dialogue through the on-going co-operation with other organizations in and outside the UN System. However, in order to achieve our goal, we must be persistent, strong and with sufficient resources.

Global co-operation and understanding is required. Here the IOC-TEMA programme has a large role to play in helping provide education and build capacities and partnerships - and for this resources are required. During 1991, within the overall TEMA component of the IOC, we have implemented 18 training courses and workshops; one intercalibration exercise; 5 advisory missions; 2 assistance projects (SAREC; UNDP); provided 45 study grants; facilitated the donation of 3 pieces of heavy equipment. One important course we are giving at the World Maritime University, Malmo, which was implemented for the fifth year in 1991. The actions have involved about 500 scientists and technicians from developing countries during 1991. I should point out that the Director-General has provided a new post as Head of TEMA to be announced.

I would also like to emphasize that there are considerable regional activities going on. The extra-budgetary supports we receive for Africa, the Caribbean and for specific programmes such as the International Musselwatch and GIPME, and the IOC-WESTPAC Symposium are very important and stimulating. We have also recently entered into closer co-operation with the European Community and the European Association of Marine Science Laboratories, in the TEMA and partnership development. An important partner in this respect is also the IAEA Monaco Laboratory. A revised tripartite agreement has been prepared concerning this co-operation between IOC, IAEA, and UNEP, and we are awaiting the response from IAEA.

We are not receiving support for the proposed UNDP projects in the WESTPAC region. One reason for this is the lack of interest and support from Member States expressed to UNDP. It is not sufficient that you express support for these projects here or in an IOC regional body; the support must be expressed to UNDP by the receiving countries through their governmental institutions. The same is the case with support for projects to be financed by the European Community. The development of the IOC Secretariat for WESTPAC is proceeding slowly. The agreement with Thailand, however, has in principle been reached with the Ministry of Foreign Affairs as well as with the National Research Council of Thailand (NRCT).

The report which I am presenting covers mainly the activities of the Secretariat; we have not explicitly stated the activities of Member States. This would lead too far. However, I would like to point out that actions are required of Member States in 13 of the 19 Resolutions adopted by the Assembly in March 1991. These actions include:

- (i) facilitating the participation and recognition of the role of IOC in relation to the negotiations for a framework convention on climate change through appropriate national and international actions;
- (ii) identification of further support for various programmes and provision of adequate funding;
- (iii) strengthening of the Secretariat through experts, secondments, etc.;
- (iv) strengthening of the TEMA programme implementation through various kinds of support;
- (v) bringing the IOC Declaration on GOOS to the attention of National UNCED representations and facilitating the IOC role in UNCED.

You must help ensure that Member States take these calls for action seriously. How many of you have been in contact with your government representatives to the UNCED Preparatory Committee and to INC/FCCC, either in response to the Resolutions of the Assembly, or to our Circular Letters?

Several of the Resolutions of the Assembly also call for actions on the part of UNESCO. The 26th General Conference was quite supportive of the IOC and definitely supported the integrated programme of the IOC and marine science related issues. The Director-General of UNESCO has been responsive to the needs



expressed by the IOC and supported by the UNESCO Governing Bodies. There is a need to strengthen the Secretariat. We need more core-staff members of UNESCO, e.g., for Ocean Mapping, GIPME, OSNLR, and OSLR.

During the year of 1991, the IOC has endeavoured to build further the cause for the oceans and their importance in environment and development, emphasizing the need for research and systematic observations for support of sustained development and management, of course including the coastal zone. The scientific basis for oceanography to become operational is available and the development and gradual establishment of the Global Ocean Observing System must proceed. It covers more than climate-related matters and you cannot subscribe to a notion that the Global Ocean Observing System is covered by the Global Climate Observing System. The ocean part of the GCOS is the climate module of the GOOS. The satellite observations provide only one necessary part of the GOOS requirements. These must be supplemented by *in situ* ocean observations. The recent Ocean Climate Data Workshop in Washington D.C. (February 1992) elucidated several related matters.

I think we are facing a most interesting period. We should seek inspiration from our visionary founding fathers; Dr. Roger Revelle being one of them, and we should try to help achieve his vision through our concerted action and dedication to the cause.

In this context, I would also like to thank the staff of the Secretariat who is working with devotion for IOC.

ANNEX IV

**EL NIÑO AND PERU: A NATION'S RESPONSE  
TO INTERANNUAL CLIMATE VARIABILITY**  
based on a paper<sup>1</sup> by Pablo Lagos<sup>2</sup> and James Bulzer

The most well-known example of climate variability is the "El Niño" phenomenon which causes large variations in global climate patterns. Significant changes in sea-surface temperature identified in the central and eastern tropical Pacific, together with variations in atmospheric pressure in the Southern Hemisphere have been termed "El Niño" Southern Oscillation (ENSO) events. In 1982-83 effects of the strongest ENSO event of this century were felt worldwide. Droughts and floods caused crop failure in many countries. There were huge drought-related fires in Borneo and Australia, drought-related eradication of sea-bird populations on islands in the Pacific, drought-related famines in India and east Africa, and flooding on the west coast of equatorial South America, in the Rocky Mountain region of the United States and in Brazil, south of the Equator.

Under the Tropical Oceans Global Atmosphere Programme, a research activity that ends in 1994, an extensive ocean observing network has been set up in the tropical Pacific in an effort to predict the onset of El Niños. Peru, concerned with the impact of El Niño events on its economy because of extensive losses suffered in previous El Niño periods, is making certain crop decisions based on these climate forecasts in order to optimize crop yields. This national experiment is an example of the use that could be made of adequate ocean data on a permanent and a global basis.

The Global Ocean Observing System will reduce the critical uncertainty that now exists in our knowledge regarding the role of the ocean in climate variability. It will provide the input and validation data for coupled atmosphere-ocean models. Sampling strategies will have to be defined on the basis of the results of these large-scale ocean climate research programmes, including the associated predictive modelling developments. Dynamic changes inside the ocean - at all depths - must be known in order to predict future changes in sea-surface temperatures which provide an important boundary condition for the atmosphere.

Dr. Pablo Lagos presented an overview of a study on "El Niño and Peru" A Nation's response to Interannual Climate Variability" based on a paper he wrote with James Buizer. The main points with respect to the application are summarized here.

The study describes the anomalous precipitation and temperature patterns observed in the agricultural, northwestern region of Peru during the 1982/83 ENSO, and analyzes the subsequent efforts by the Peruvian Government to mitigate the adverse socio-economic impacts due to variability in their climate. Finally, some actions which need to be taken in order to improve our ability to predict interannual climate variability, and to better prepare policy-makers throughout the world in the use of these predictions, are suggested.

Although no two ENSO events are exactly alike in their intensity (defined by the size of departure from average SSTs), geographic manifestation, duration or impacts, some general statements can be made to characterize the phenomenon. During ENSO years, a weakening or collapse of the predominant easterly winds in the central and eastern tropical Pacific, along with associated anomalous SST warmings, result in a shift of precipitation patterns throughout the region. The low pressure area which normally resides over eastern Indonesia shifts eastward, taking with it the associated atmospheric convection, and hence precipitation, into the central Pacific. ENSOs have been characterized as consisting of 4 phases: a precursory phase, an onset phase, a phase when the anomalous conditions grow and mature, and a phase during which anomalous conditions decay, lasting anywhere between 6 and 24 months (Nicholls, 1987).

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<sup>1</sup> In: S.K. Majumdar, E.W. Miller, G.S. Forbes and R.F. Schmalz  
(Ed.) *Natural and Technological Disasters: Causes and Effects and  
Preventive Measures*. The Pennsylvania Academy of Science  
Publication, Easton, PA. 1992.

<sup>2</sup> Permanent affiliation: Instituto Geofísica del Peru, Lima, Peru.

During ENSO events, the Inter Tropical Convergence Zone (ITCZ) is observed to shift further south, even crossing the Equator when the episodes are strongest. Furthermore, SST values off the coast reach 2°-12°C above normal, depending on the strength of the event. As a result of this southward shift of the ITCZ, atmospheric convection becomes more intense. This, combined with increased evaporation associated with higher SSTs, lead to relatively large increases in precipitation initially near the coast and then moving eastward. These increases are most pronounced at altitudes of up to 300 meters, with more modest increases above that height. The dramatic increase in rainfall often results in flooding and mud slides along the western flank of the Andean mountain range.

### **The Socio-Economic Impacts on Peru**

Historically, droughts and floods have been the greatest natural causes of famine in Peru, while earthquake-induced landslides have been among the most destructive throughout the Andean region. During ENSO events, heavy and repetitive convective rainstorms have been the main cause for the devastating flash floods in the western Andean foothills and in the coastal plains region, whereas, during Cold Events, a lack of precipitation leads to drought. The effects of droughts and floods on total food production have caused much human suffering and stress to society. Crop failures have led to shortages of food and loss of employment, causing great social and political concern.

The compilation of quantitative information on the impact of ENSO phenomena in Peru began after the 1972-73 event, when the Peruvian anchoveta fisheries collapsed. For this reason, impact studies originally focused on the fisheries sector, and not on agriculture and other sectors. However, during the 1982-83 event, damage to the agricultural sector due to floods and drought, exceeded that to fisheries. As a consequence, detailed information regarding impacts on land-based resources during this event are now more readily available.

### **The Government Response**

The strongest events have impacted the nation's capacity to produce food so severely that famine has resulted, along with the associated ills, such as malnutrition and disease. Until recently, the Government of Peru has had no option but to "mop up" after the event; for example, the well-documented collapse of the Peruvian anchoveta fisheries associated with the 1972-73 event.

In Peru, as in most developing countries in the tropical region, the nature of economic activities is highly sensitive to the variability of climate, particularly in the agricultural sector. Therefore, these countries have potentially the most to gain from an ability to forecast seasonal variations in precipitation, especially as it relates to the growing season. To be useful, any forecast must be accompanied by an effective communication network so that the information will reach the affected communities.

For example, if upcoming precipitation patterns were predicted with reasonable accuracy one to two months before the growing season begins, farmers could be advised with greater confidence on the optimal crop which should be planted for the projected amount of rain and ambient temperature, hence increasing their yields. To a farmer, knowledge of the timing of the onset of the rainy season is critical, as it determines the timing of the planting of his crops. Quantitative forecasts of the amount and temporal distribution of precipitation and the range of ambient temperature during the growing season is important for planning purposes, but more difficult to forecast. Furthermore, in the fisheries sector, a forecast of future physical oceanic conditions in general, and anomalous events like ENSO in particular, would allow for strategic planning and adjustments in fishery practices, which should result in reduced capital losses and reduced unemployment.

Prior to the 1982-83 ENSO event, citizens and policy makers in the Peruvian agricultural sector were unaware of the availability of climate data collected outside the region that could be used in national economic planning and mitigation of impacts of anomalous climate. They became aware of the potential benefits of proper application of available information only after the 1982-83 event, when a series of experimental forecasts were attempted, based on improved understanding of the dynamics of ENSO.

The example presented here refers to the application of the climate forecast to crop productivity in the northern coastal region of Peru, a region where precipitation and ambient temperature are known to be well correlated with ENSO events (see Figure 1).

In Peru, economic development is based on a set of inter-related national plans for each social and economic sector. The agricultural plan is, by constitutional law, a component of utmost priority within the national economic plan. Its purpose is to promote the efficient development of the sector. It sets forth the basic actions and general goals to be followed by the various public and commercial agencies involved. Specifically, the programme establishes annual guidelines and goals for production. The execution of the programme is subjected to continuous evaluation which allows for pertinent correction and for the improvement of the formulation of future plans. The Government, through the Ministry of Agriculture and the national committees of non-governmental agrarian organizations together play a critical role in achieving the agricultural production goals, through a consensus-building process. The issues debated include regulation of water distribution in the irrigated areas, prices of fertilizer, interest rates for loans from the agrarian bank and prices of agricultural products. They also discuss the provision of subsidies for particular goods, as well as the availability of technical assistance in certain areas.

Once the 1982-83 event ended and the rains ceased (late June 1983) the entire population along the northern coastal region, as well as the industries related to agriculture and the agrarian organizations and the Government itself, shared a deep concern about what would happen during the subsequent rainy season. Based on knowledge of the behaviour of some previous events, there was local speculation that the heavy rains would return in late 1983 or early 1984. The need for scientific advice was obvious. Peruvian scientists attempted to explain what had happened and proposed to develop a programme to forecast future events. The first task was to forecast the climate conditions for the upcoming season. A network of communication to receive extra regional climate-related information was set up in September 1983 and analysis of the data began.

The results, based on the analysis of current global ocean-atmosphere observations, indicated that the event would not be repeated in the following rainy season, and were presented early in November 1983 to the heads of the agrarian organizations, banking officials, and to the Minister of Agriculture. This information was incorporated into national planning for the 1983-84 agrarian campaign, as well as in the ongoing reconstruction programme, and plans of other government and private agencies. The 1983-84 agrarian campaign was a successful one.

From this point on, in early November of each year, a forecast of the character of the upcoming rainy season has been incorporated into national planning for the agricultural sector. The scenario can be described as follows: in September of each year, scientists at the Peruvian Geophysical Institute (IGP) analyze the pertinent oceanographic and meteorological data, consult with modelers in the US and elsewhere, and prepare a November forecast based on the current understanding of the evolution of ENSOs and Cold Events, and their impacts on the climate in the north-western region of Peru. This forecast is presented as one of 4 possibilities: (i) normal or average condition, (ii) slightly warmer and wetter than normal, (iii) ENSO condition, and (iv) Cold Event - colder and drier than normal. Once the forecast is made, on behalf of the farming community, the Head of the non-governmental agrarian organization and Governmental officials meet to arrive at a production strategy. Decisions are made, based on the outlook for the coming rainy season, regarding the appropriate combination of crops to be sown, in order to maximize the yield of the area planted. For example, rice and cotton, which are two of the primary crops sown in the north-eastern region, are highly influenced by the quantities and timing of rainfall. For maximum yields, rice needs large volumes of water and relatively dry and cooler night-time temperatures during the ripening phase. Rainfall is by far the most limiting climatic constraint to the growth of rice. On the other hand, cotton, with deeper root structure, is capable of thriving, hence yielding greater production, during years of light precipitation. Once a forecast is made, farmers can choose the optimal combination of crops to sow. Figure 2 shows the area sown with rice and cotton in the northern coastal region between 1980 and 1987. Notice the areal increase or decrease, depending on the forecast beginning in the 1983-84 growing season.

Of particular interest is the 1987 ENSO forecast. This forecast, issued in late September 1986, was based on results of models developed in the US combined with oceanographic and atmospheric data collected in the tropical Pacific. It looks as though an ENSO event of moderate intensity was developing. The information circulated throughout the scientific community, as well as throughout Government agencies and even by the popular media. The President of Peru called his experts together, and, after much debate, issued an official announcement of the forecast in late December 1986. Again, the forecast was used in the formulation of national agricultural planning and in other sectors, as early as October 1986.

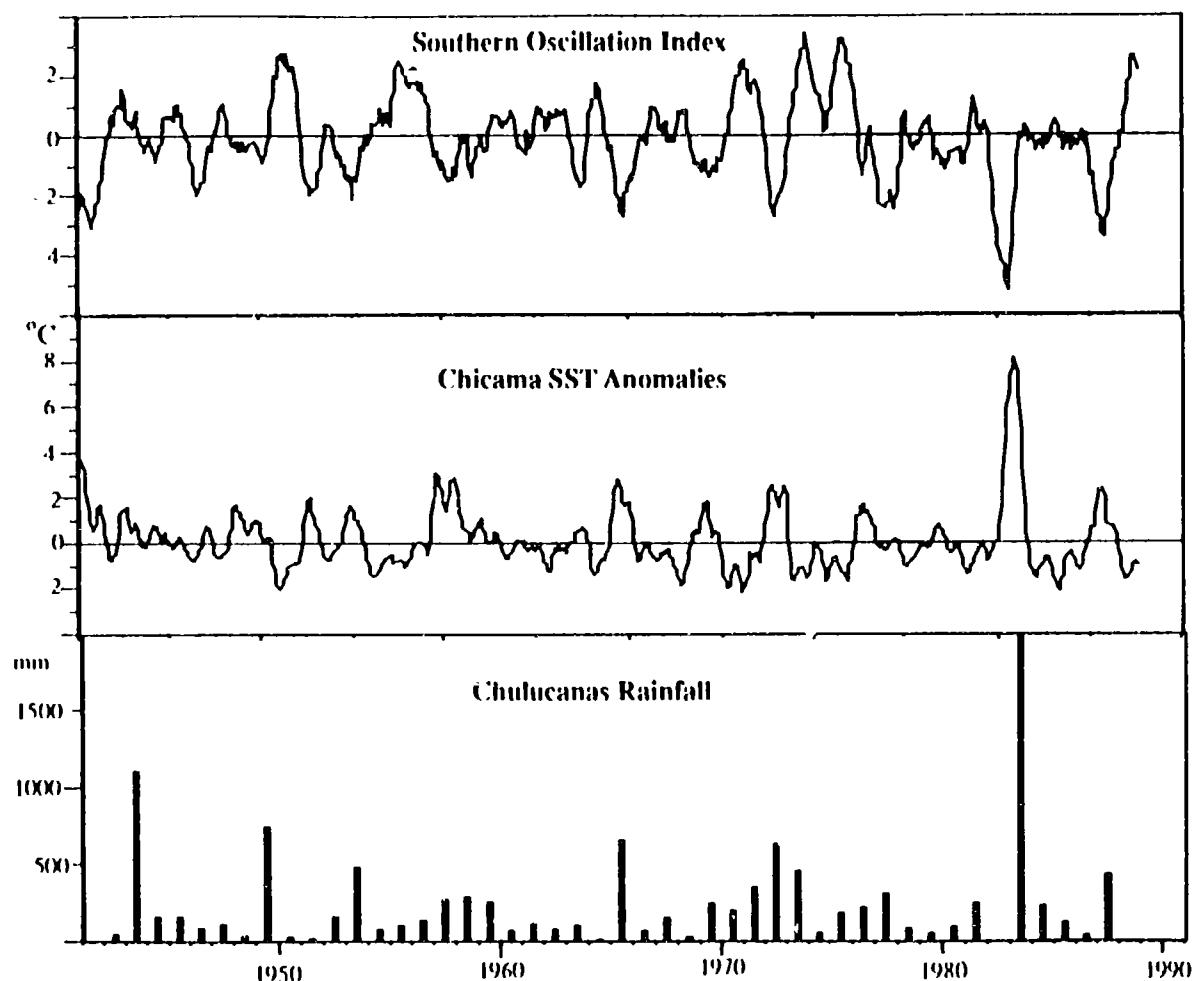


Figure 1. Southern Oscillation Index (SOI), SST anomalies at Chicama, and rainfall at Chulucanas. The SOI is the five-month running mean of the difference between the standardized sea-level pressure anomalies at Tahiti and Darwin (Tahiti-Darwin). The SST at Chicama is of the five-month running monthly means. The rainfall at Chulucanas is the accumulated seasonal (January-April) precipitation of each year.

It should be recognized that, although much work remains to be done to improve the predictive skill of coupled General Circulation Models, great progress has been made in making predictions of ENSO as a result of improved understanding of the dynamic ocean and atmospheric systems in the tropics. The TOGA community feels it is time to pursue a more systematic investigation of the predictability of the tropical climate system and to begin planning for routine and regular predictions of the atmospheric and oceanic fields connected with the phases of ENSO. To this end, the TOGA Programme on Seasonal to Interannual Prediction is being developed.

As the skill of climate prediction improves, the economic benefit associated with the applicability of this information will increase. The Peruvian experience can provide insights into how societies in other countries might become prepared to benefit from such climate forecasts in the future. In order that individual nations can benefit from ENSO predictions, however, they must have a good understanding of their mean and anomalous climate and precipitation patterns. Nations must organize themselves to benefit from the effort of the international scientific community in providing reliable predictions. This means analysis of existing historical datasets as well as improved systematic data collection efforts. Statistical studies of relationships between regional precipitation patterns and specific ENSO and Cold Events will assist nations in characterizing the different manifestations of the various ENSO "types".

Predicting ENSOs and understanding the related fluctuations in temperature and precipitation patterns is not enough. Economists and social scientists must be encouraged to join their physical and natural science colleagues in studying the impacts of this phenomenon on society. Unless we have specific evidence on how society will be affected by a particular change in climate, decision-makers will be unprepared to act, either to minimize adverse impacts, or maximize positive impacts. Studies of the economic benefits of societal and governmental responses to climate forecasts should be encouraged.

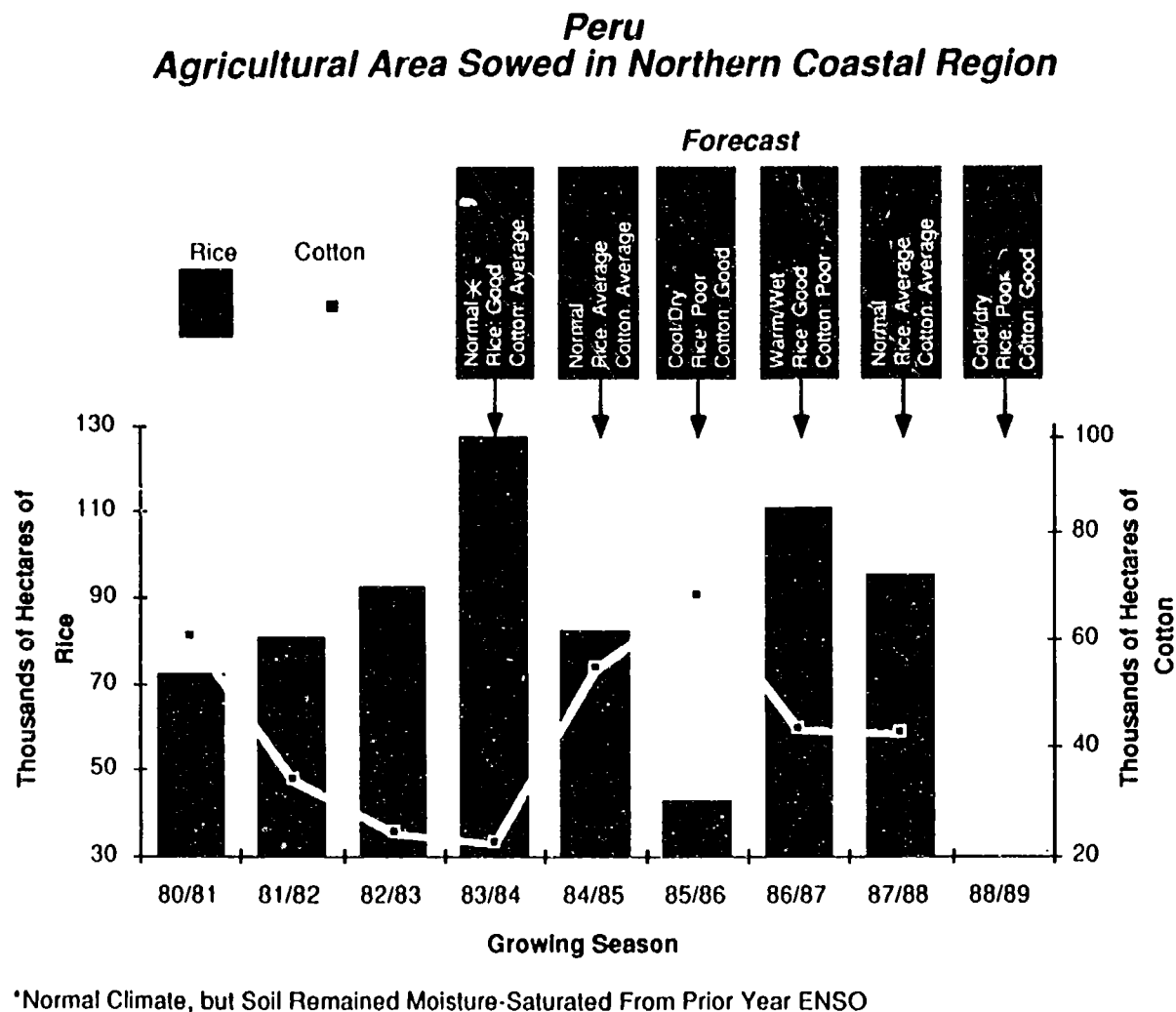


Figure 2. Pre- and post-ENSO 1982-83 agricultural area sown in the northern coastal region of Peru. Forecast was issued at least one month before the beginning of each crop season.

ANNEX V

LIST OF WORKING DOCUMENTS <sup>1</sup>

Document Code	Title
IOC/EC-XXV/1	Agenda
IOC/EC-XXV/1 Add.rev.1	Revised Timetable
IOC/EC-XXV/2	Annotated Provisional Agenda
IOC/EC-XXV/3	Summary Report
IOC/EC-XXV/4	List of Documents
IOC/EC-XXV/5	List of Participants
IOC/EC-XXV/6	Report of the Secretary on Intersessional Activities
IOC/EC-XXV/6 Suppl.	List of Circular Letters, IOC Meetings, Meetings at which IOC was represented, IOC Information Documents
IOC/EC-XXV/7 Pts.I & II	Status Report on the IOC Programme and Budget
IOC/EC-XXV/8	Action Paper
IOC/EC-XXV/8 Annex 1	Global Ocean Observing System Development: Progress Report
IOC/EC-XXV/8 Annex 2	Proposal for Strategies for the Protection of the Oceans and Coastal Areas

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<sup>1</sup> This list is for reference only. No stocks of these documents are maintained, except for the Summary Report.



**ANNEX VI/ANNEXE VI/ANEXO VI/ПРИЛОЖЕНИЕ VI**

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ANNEX VII

LIST OF ACRONYMS

ASEAN	Association of South-East Asian Nations
ASPEI	Association of South-Pacific Environmental Institutions
ASOEM	Asian Senior Environment Officers Meeting
ATCM	Antarctic Treaty Consultative Meeting
BAC	Climate Alert Bulletin
BATHY	Bathymograph Report
BERPAC	Bering Sea-Pacific Project
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCCO	Joint SCOR-IOC Committee on Climatic Changes and the Ocean
CCOP	Committee for the Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas
CEP POL	Marine Pollution Assessment and Control Programme for the Wider Caribbean (IOC-UNEP)
CMSPBS	Co-operative Marine Science Programme for the Black Sea
COASTS	Programme on Coastal Ocean Advanced Science and Technology Study
COMAR	Major UNESCO Interregional Project on Research and Training Leading to the Integrated Management and Coastal Systems
COSALC	Regional Project on Research and Training on Coastal Systems in Latin America and the Caribbean and their Relation with the Continental Shelf
COST	Committee on Science and Technology (ASEAN)
CPPS	Permanent Commission for the South Pacific
CPR	Continuous Plankton Recorder
CRP	Consolidated Rehabilitation Programme
DBCP	Drifting Buoy Co-operation Panel

DOSS	<i>Ad hoc</i> Study Group on IOC Development, Operations, Structure and Statutes
ECOR	Engineering Committee on Oceanic Resources
ENSO	El Niño and the Southern Oscillation (USA)
ERFEN	Estudio Regional del Fenómeno 'El Niño'
FAO	Food and Agriculture Organization of the United Nations
FCCC	Framework Convention on Climate Change
GCNS	Global Coastal and Nearshore Monitoring System
GCOS	Global Climate Observing System
GEEP	Group of Experts on Effects of Pollutants (IOC-IMO-UNEP)
GEF	Global Environment Facility
GEMS	Global Environment Monitoring System (UNEP)
GEMSI	Group of Experts on Methods, Standards and Intercalibration (IOC-UNEP)
GESREM	Group of Experts on Standards and References Material (IOC-IAEA-UNEP)
GF-3	General Format No.3
GIPME	Global Investigation of Pollution in the Marine Environment (IOC)
GLOBEC	Global Ocean Ecosystem Dynamics
GLOSS	Global Sea-Level Observing System (IOC)
GOOS	Global Ocean Observing System
IAEA	International Atomic Energy Agency
ICES	International Council for the Exploration of the Sea
ICG	International Co-ordination Group
ICSPRO	Inter-secretariat Committee on Scientific Programmes Relating to Oceanography
ICSU	International Council of Scientific Unions
IDNDR	International Decade for Natural Disaster Reduction
IGBP	International Geosphere-Biosphere Programme (ICSU)
IGOSS	Integrated Global Ocean Services System (IOC-WMO)
IHO	International Hydrographic Organization



IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
INC	Intergovernmental Negotiation Committee for a Framework Convention on Climate Change
INPE	Instituto Nacional de Pesqueras Especias
IOCARIBE	IOC Sub-Commission for the Caribbean and Adjacent Regions
IOCINCWIO	IOC Regional Committee for the Co-operative Investigations in the North and Central Western Indian Ocean
IODE	International Oceanographic Data and Information Exchange (IOC)
IPCC	Intergovernmental Panel on Climate Change (UNEP-WMO)
IPP	Integrated Project Plan
IREP	Integrated Recruitment Programme
ITIC	International Tsunami Information Centre
ITSU	International Tsunami Warning System in the Pacific
IUCN	World Conservation Union
JGOFS	Joint Global Ocean Flux Study (SCOR-IOC)
JSC	Joint Scientific Committee (ICSU-WMO)
LME	Large Marine Ecosystems
LOICZ	Land-Ocean Interaction in the Coastal Zone
MARPOLMCN	Marine Pollution Monitoring System (IOC)
NOAA	National Oceanic and Atmospheric Administration (USA)
OAU	Organization of African Unity
ODAS	Ocean Data Acquisition Systems, Aids and Devices
ODP	Ocean Drilling Programme
OOSDP	JSC-CCCO Ocean Observing System Development Panel
OPC	Ocean Processes and Climate (IOC)

OSLR	Ocean Science in Relation to Living Resources (IOC-FAO)
OSNLR	Ocean Science in Relation to Non-Living Resources (IOC-UN(OALOS))
PICES	North Pacific Marine Science Organization
RNODC	Responsible National Oceanographic Data Centre (IODE)
ROPME	Regional Organization for the Preservation of the Marine Environment
RV	Research Vessel
SAREC	Swedish Agency for Research Co-operation with Developing Countries
SARP	Sardine-Anchovy Recruitment Project (IREP)
SCOR	Scientific Committee on Oceanic Research (ICSU)
SOC	Specialized Oceanographic Centre
SSG	Scientific Steering Group
TEMA	Training, Education and Mutual Assistance in Marine Sciences (IOC)
TESAC	Code for reporting an observation of temperature, salinity and currents from a sea station
TIME	Tsunami Inundation Modelling Exchange Project
TOGA	Tropical Oceans and Global Atmosphere (WCRP)
UN	United Nations
UNCED	1992 United Nations Conference on Environment and Development
UNCLOS	UN Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WESTPAC	IOC Sub-Commission for the Western Pacific
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WWW	World Weather Watch