Intergovernmental Oceanographic Commission
Reports of Governing and Major Subsidiary Bodies

Sixteenth Session of the Assembly

Paris, 7-21 March 1991

UNESCO

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1. OPENING

1 The Chairman, Professor Ulf Lie, opened the Sixteenth Session of the IOC Assembly at 10.00 on 7 March 1991.

2 The Assembly took note with appreciation of the statements made by the Chairman, by the Director-General of UNESCO (given on 13 March), Mr. Federico Mayor, and the Assistant Director-General of UNESCO for Science, Mr. Adnan Badran, on the occasion of the opening of the Assembly (Annex III-A, B and C).

3 The Chairman called on the participants to stand in silence for one minute as a mark of respect for distinguished individuals who had collaborated with the Commission or had been concerned with marine science and had passed away since the Fifteenth Session. Special reference was made to J. Douglas Bradford (Canada), Takahisa Nemoto (Japan) and Arno Voipio (Finland) who had loyally served the Commission in various capacities over many years.

2. BRUUN MEMORIAL LECTURES

4 The Assembly noted that the Bruun Memorial Lectures, to be given on 7 March on the theme "Modelling and Prediction in Marine Science", included: (i) Overview of the Coastal Ocean Prediction Systems Programme, by C.N.K. Mooers; (ii) The Barents Sea/The Physical-Biological Connection, by E. Sakshaug; (iii) The Real-Time Numerical Forecasting System for Marine Environmental Elements in China, by Chao Jiping. Abstracts of the Lectures are given in Annex V. The texts will be published in the IOC Technical Series.

3. ADMINISTRATIVE ARRANGEMENTS

3.1 ADOPTION OF THE AGENDA

5 On the initiative and proposal of the Delegate of the Islamic Republic of Iran, a new item, 8.3.6 (Collaboration with ROPME), was put on the Agenda.

6 The Assembly adopted the Agenda (Annex I, hereto).

3.2 DESIGNATION OF THE RAPPORTEUR

7 The Assembly accepted the proposal by Norway to designate Dr. Lim Joo Tick (Malaysia) as Rapporteur for the Session.

3.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

8 The Assembly noted that, under Rule of Procedure N° 12 (2), the Executive Council, acting as the Steering Committee for the Assembly, had decided that the Nominations Committee for the Sixteenth Session be composed of: Poland (Chairman), China, Egypt, Indonesia, Nigeria, USSR, USA, and Venezuela.

9 The Assembly established the Technical Review Committee for Resolutions with the following composition: Pakistan (Chairman), Algeria, Argentina, Brazil, China, France, Indonesia, Nigeria, Spain, Sri Lanka, USSR, UK, USA and Venezuela.

10 The List of Working Documents is given in Annex X. The List of Participants is given in Annex IX. The List of Acronyms is given in Annex XI.

4. REPORT ON THE COMMISSION'S ACTIVITIES, 1989-1990

4.1 SECRETARY'S REPORT ON INTERSESSIONAL ACTIVITIES

11 In presenting his Report on Intersessional Activities (Documents IOC-XVI/6 and 6 Suppl.), the Secretary provided an overview of the major activities which had been carried out and highlighted the trends that have marked IOC programme implementation during 1989 and 1990.

12 He emphasized the extent to which programme implementation had been accelerated in such areas as climate change and the establishment of a global ocean observing system, in accordance with the instructions of the Governing Bodies. The concomitant commitment of resources had resulted in considerable strengthening of IOC's role and credibility in activities connected with the Second World Climate Conference (Geneva, 1990) and the 1992 UN Conference on Environment and Development. At the same time, he stressed that, unless there was some increase in anticipated resources, it would be necessary to rephase certain planned activities and he looked to the Assembly for guidance on this matter.

13 Numerous Delegates, endorsing the action by the Secretary in carrying out the programme, highlighted examples of successful implementation of particular interest to their countries and regions. Some suggestions were made for improving future reports, notably through introductory texts in which the Secretary would provide his views on progress and shortfalls, as well as a clearer delineation of policy issues to be considered by the Governing Bodies.

14 The Assembly, while appreciating the constraints under which the Secretariat is working, voiced its deep concern regarding the deterioration in availability and timeliness of documentation in all the working languages of the Commission.

15 Noting the associated serious and negative implications for the scientific community, the Assembly decided to look into this matter further under Agenda Item 12.

16 **The Assembly accepted** the Report of the Secretary on Intersessional Activities and **congratulated** the Secretary on the exceptional efforts made in carrying out the programme and ensuring that the views of the Commission were taken into account in other intergovernmental fora.

4.2 REPORT ON THE COMMISSION'S ACTIVITIES IN 1989-1990

17 The Secretary presented the draft Biennial Report of the Commission which, in accordance with the IOC Statutes, will be transmitted to the 26th UNESCO General Conference. He reminded Delegates of the limited number of pages allocated for this report which, in consequence, could only provide a brief overview of the many activities undertaken by the Commission during 1989-90.

18 Noting that such reports, as in the past, had to serve in addition to the oral presentation by the Chairman of IOC in Committee III of the forthcoming UNESCO General Conference, **the Assembly requested** the Secretary to make a few additions concerning the budget, staffing of the Secretariat, and the TEMA programme, **and adopted** the Biennial Report for 1989-90 for transmission to the General Conference.

5. OCEAN SCIENCES

5.1 THE OCEAN'S ROLE IN CLIMATE AND GLOBAL CHANGE: OCEAN PROCESSES AND CLIMATE

19 This item covers comprehensive issues related to climate and global-change programmes in which the Commission is participating. The discussion on the development of the global ocean observing system is referred to in Item 6, sub-items 6.1.1, 6.1.2, 6.1.3.

5.1.1 Fourth Session of the IOC Committee on Ocean Processes and Climate

20 The Vice-Chairman of the Committee, Dr. Mario Ruivo, presented the Executive Summary and Recommendations of its Fourth Session, held in Paris, 27 February-1 March 1991 (Document IOC/OPC-IV/3S).

21 He pointed out that the Committee had reviewed the implementation of the study of the Tropical Oceans and Global Atmosphere (TOGA) and the World Ocean Circulation Experiment (WOCE), the design and planning of the Global Ocean Observing System (GOOS) and its interaction with the proposed Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change and with the Global Climate Observing System (GCOS) proposed by the Second World Climate Conference (SWCC). The Committee had also reviewed IOC involvement in the Second World Climate Conference and activities of the WMO-UNEP Intergovernmental Panel on Climate Change (IPCC) and of the Preparatory Committee for the United Nations Conference on Environment and Development (UNCED) 1992. The IOC Committee had then considered some aspects of new technology developments, such as marine acoustics and satellites, and had identified major areas of IOC's activities for the 1991-1993 period in the field of ocean dynamics and climate to be considered by the IOC Assembly with respect to formulation of the IOC programme and budget for this period.

22 Dr. Ruivo drew particular attention to the recommendations of the Committee that require consideration and approval by the Assembly. These included recommendations on: the development of GOOS, the establishment of a GOOS Support Office and its relation to the proposed GCOS Planning Office (Resolution OPC-IV.1); support for the World Ocean Circulation Experiment (WOCE) (Recommendation OPC-IV.1); implementation of the Global Sea-Level Observing System (GLOSS) (Recommendation OPC-IV.2); IOC's participation in the preparations for the United Nations Conference on Environment and Development (UNCED) (Recommendation OPC-IV.3) and a proposed draft statement for UNCED by the Sixteenth Session of the IOC Assembly (Document IOC/OPC-IV/3S Add.1) prepared in response to this recommendation; and IOC's participation in negotiations on the preparation of a framework convention on climate change (Recommendation OPC-IV.4). The Committee had also emphasized that the proposed activities, particularly those related to GOOS planning, and technical assistance and training activities in support of GOOS, would require substantially increased financial and staffing support to IOC from UNESCO and IOC Member States.

23 The Assembly expressed its support for the proposals and recommendations of the Fourth Session of the Committee on Ocean Processes and Climate, and decided to continue discussion of the specific OPC-IV recommendations under appropriate agenda items.

24 The Assembly expressed its gratitude to the Secretary of IOC, the Committee on Ocean Processes and Climate and the SCOR-IOC Committee on Climatic Changes and the Ocean (CCCO) for their efforts to strengthen IOC's role and participation in the World Climate Research Programme (WCRP), the Second World Climate Conference and follow-up activities, and in the activities of the IPCC and the Preparatory Committee for UNCED.

25 The Assembly emphasized the essential role of oceans in climate prediction and the vital role of IOC in climate studies, particularly through the continued strong participation in the implementation of TOGA and WOCE, as well as in climate monitoring. The Assembly decided to seek IOC co-sponsorship, with WMO, ICSU and UNEP, of the World Climate Programme (WCP), and particularly the research component (WCRP).

26 The Assembly pointed out the need to improve links between the oceanographic and meteorological communities at the national and international levels, as well as between governmental and academic institutions, so as to ensure the most effective and rational use of available resources for the continuation of climate studies and the development of international observing systems.

27 The Representative of WMO fully shared these views of the Commission and welcomed the intention of IOC to co-sponsor the WCP, and the WCRP in particular. He noted, in this connection, that this will require a commitment of resources (financial and human) from IOC.

28 The Assembly instructed the Secretary to disseminate periodically to Member States information on developments in the context of the activities of the UN Intergovernmental Negotiating Committee (on the preparation of a framework convention on climate change).

29 The Assembly adopted Resolution XVI-1[1] (see also the related Resolutions XVI-2 and XVI-3 in Sections 5.1.4 and 5.1.7, respectively).

5.1.2 Eleventh Session of the SCOR-IOC Committee on Climatic Changes and the Ocean (CCCO)

30 The Chairman of the SCOR-IOC Committee on Climatic Changes and the Ocean (CCCO), Prof. James J. O'Brien, introduced this item. He informed the Assembly of several important efforts being undertaken by the Committee, notably:

(i) Ocean Observing System Development. The development of a scientifically based plan for ocean observations relevant to climate change has been identified as a matter requiring urgent attention. The highest priority will be given to the elements necessary for operational modelling and the prediction of interannual events such as El Niño/Southern Oscillation. The Committee has requested its CCCO-JSC Ocean Observing System Development Panel to map out a draft plan for an observing system based on conventional upper- ocean measurements. Since routine monitoring of near-surface salinity is not currently feasible, this problem would receive urgent attention when addressing the global fresh-water budget.

(ii) Carbon Dioxide Gas Exchange on Gyre-Global Scale. The design of a plan to acquire a global oceanic data set, including pCO_2, total CO_2 and alkalinity, has been identified as an important international priority. The Committee has proposed to JGOFS that the joint JGOFS-CCCO Carbon Dioxide Panel address this matter under revised Terms of Reference and Membership.

(iii) Review of IPCC Working Group-I Report on the Scientific Assessment of Climate Change. The authors of the Report of Working Group I of the Intergovernmental Panel on Climate Change considered the Report as a summary of the state of knowledge as of early 1990. The Working Group has stated that one of its goals is to update its report at frequent intervals. The CCCO has undertaken a review of the sections of the IPCC WG-I report relating to the ocean. The CCCO will assess the degree to which the report is an accurate and comprehensive summary of current knowledge of ocean dynamics, ocean-atmosphere interaction and ocean chemistry in relation to global climate prediction and climate change, propose appropriate action to be undertaken by CCCO, and provide advice to the IPCC WG-I.

(iv) Fresh-Water Budget. Regarding global-energy and water-cycle research, the cycles must be closed by information on the energy and mass exchanges across the ocean surface and the upper-ocean transport of heat and salt. Ocean general-circulation models will need to be developed to assimilate satellite data with *in situ* surface and subsurface measurements. Observations of heat and fresh-water content in the upper ocean are required to narrow the uncertainty of the surface fluxes and for use in methods to determine the surface fluxes as constraints on the energy and water cycles. The CCCO officers will address the action needed from CCCO and report to the next session.

(v) Improving Predictions of the Regional Impact of Climate Change on the Coastal Environment. There is a need to encourage further investigation on how a global rise in mean sea level would be manifested as geopotential differences, and how changes in ocean currents would affect regional sea levels. The CCCO Atlantic, Indian and Pacific Ocean Climate Studies Panels have been asked to examine the questions and to report to the CCCO on the feasibility of improving predictions on a regional basis and identifying potential studies to this end.

(vi) Control of Thermohaline Circulation. Consideration of the influence of the Arctic Ocean on climate represents a gap in the programmes being conducted within the WCRP. It is not included in WOCE. The feasibility of an Arctic experiment on the relation between circulation, salinity structure, freezing and melting, of the establishment of the fresh-water budget in the Arctic Ocean, and of the deep-

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[1] The Adopted Resolutions are given in Annex II hereto.

water production in the North Atlantic needs to be investigated. The recently formed JSC-CCCO Working Group on Sea-Ice and Climate was requested to address this matter and present a report to the next meetings of the CCCO and JSC.

31 The ICSU-WMO Joint Scientific Committee is the scientific overseer of the World Climate Research Programme (WCRP). In the past year, a special collaboration with CCCO has been arranged whereby the JSC has been reorganized to include a CCCO Executive comprised of four oceanography experts appointed by the CCCO. For the Tropical Ocean and Global Atmosphere (TOGA) study and the World Ocean Circulation Experiment (WOCE), this means that the annual report on implementation to JSC and CCCO will be accomplished by a report to the combined JSC/CCCO (next meeting in Bremen, Germany, 18-23 March 1991). CCCO still expects to consider TOGA and WOCE initiatives at CCCO meetings; however, the Committee will also provide a forum where new ideas, including those on post-TOGA and post-WOCE activities, may be considered.

32 The success of the TOGA Study in forecasting El Niño was noted. Successful forecasts have been used by the countries in South America to influence management decisions on agriculture. Particularly good success has been experienced in northern Peru. Studies of the ocean's effects on climate variability will yield important insights into the assessment of the impacts of human uses of the planet Earth. The important support of the Global Ocean Observing System by each coastal country through the collection and exchange of the regional data essential to climate studies was stressed.

33 With regard to the future, Prof. O'Brien described the Global Ocean Observing System as an extremely important activity of IOC and referred to an electronic poster display at the Assembly that demonstrated the visualization of many satellite and ocean model data bases. The display demonstrates the potential of assimilated oceanographic data bases as a source of future operational oceanographic products

34 Several Delegates stressed the necessity of making these data available to developing Member States of the Commission.

35 **The Assembly supported the new arrangements between the JSC and the CCCO and emphasised the importance of having one WCRP with effective meteorological and oceanographic collaboration. The Assembly emphasized and re-confirmed the willingness of the IOC to participate (subject to financial and staffing constraints) in a full and active partnership within the World Climate Research Programme and within the service and application areas of the World Climate Programme (WCP). Several Delegates stressed the importance of enhanced meteorological and oceanographic co-operation at the national and international levels. (See Resolutions XVI-2, in section 5.1.4, and XVI-3, in section 5.1.7.)**

5.1.3 Study of the Tropical Ocean and Global Atmosphere (TOGA)

36 The Secretary of the CCCO, Mr. Ray Godin, introduced the Executive Summary of the Fourth Session of the WMO-IOC Intergovernmental TOGA Board (Geneva, 8-11 January 1991).

37 **The Assembly noted the Report and expressed its satisfaction with the continuing progress of TOGA. Several Delegates supported the concept of an International Climate Prediction Centre. The Assembly expressed strong support for the TOGA Coupled Ocean-Atmosphere Response Experiment (COARE) and stressed its importance for predictions on an interannual time scale. The Assembly emphasized the importance of increased TOGA activity in the Indian and/or Atlantic Oceans. The Assembly reiterated the importance of the TOGA results for the development of a cost-effective global ocean observing system.**

5.1.4 World Ocean Circulation Experiment (WOCE)

38 The Rapporteur of the First Session of the IOC-WMO Intergovernmental WOCE Panel (Paris, 22-25 October 1990), Mr. Geoffrey Holland, introduced this item. The Chairman of the Panel, Dr. Leo Otto, in reporting to OPC-IV, had expressed the view that more countries should participate in WOCE and that opportunities existed to contribute to the experiment at many levels of technological

capability. WOCE is well underway but concern was expressed that many of the indicated contributions were still tentative and that additional resources for unsubscribed or unconfirmed elements of the programme needed to be found for its successful implementation. The Intergovernmental WOCE Panel had noted that attention needed to be given, by the Scientific Steering Group (SSG) for WOCE, to preparing a scientific justification of the importance of missing elements of the programme so that governmental agencies would be helped to find the necessary support. WOCE depends on the availability of satellite data as well as data gathered directly, and the Panel recommended closer attention by the IOC to the planning for Earth Observation Satellites as well as a more active interaction between the IOC and the relevant agencies.

39 The Delegate of Brazil informed the Assembly of his country's willingness to ensure future continuation of the training course in dynamical oceanography related to WOCE convened at the University of Sao Paulo (15 October-15 December 1990) with up to 30 participants.

40 The Delegate of Germany informed the Assembly that his country will contribute to WOCE in 1991 by cruises of the RVs POLARSTERN, METEOR, SONNE and VALDIVIA to the Atlantic Ocean, Indian Ocean and the Weddel Sea.

41 The Assembly confirmed the high priority it gives to WOCE. The Assembly directed the Secretary to offer assistance to the Committee on Earth Observation Satellites (CEOS) in the planning of future oceanographic sensors. Some Delegates indicated that their respective governments were considering increasing their commitments to the Experiment. One Delegate noted that not all requirements for the WOCE observation programme needed sophisticated technology and that sea-level stations, XBT measurements and drifting-buoy deployment were within the capabilities of most Member States. Many Delegates stressed the importance of training and assistance and the need for scientists from developing countries to be involved at all levels of the planning, implementation and interpretation of WOCE. The importance of access to the WOCE data was stressed. The Assembly emphasized its view that the further development of the Global Ocean Observing System was dependent upon the successful implementation and results of global experiments such as WOCE and TOGA.

42 The Assembly adopted Resolution XVI-2.

5.1.5 Ocean Dynamics and Circulation on the Continental Shelf

43 The Deputy Secretary IOC introduced the proposed draft Programme on Coastal Ocean Circulation Dynamics and Fluxes (Document IOC-XVI/8 Annex 1 with Appendix), which was prepared by the IOC Secretariat in co-operation with Prof. Alan Robinson, of Harvard University (USA). It represents a further development of the first draft Programme Plan, formulated pursuant to Resolution XV-3 of the Fifteenth Session of the IOC Assembly (Paris, 4-19 July 1989), by an *ad hoc* Group of Experts (Paris, 28-30 May 1990). As requested by the Fifteenth Session of the IOC Assembly, a workshop using the programme proposal as a substantive background document will be organized later this year (tentatively July 1991). Pursuant to Resolution XV-3, the Secretary had ensured effective interaction with other relevant Programmes and Organizations, and in particular with SCOR.

44 SCOR has accepted an invitation to co-sponsor the workshop; suggestions and comments on the draft programme will be discussed and incorporated by a small *ad hoc* meeting of experts to be held on the occasion of the 23rd International Hydrodynamics Colloquium, in Liège, Belgium, 6-10 May 1991.

45 The Assembly took note that the IOC Committee on Ocean Processes and Climate, at its Fourth Session (Paris, 27 February-1 March 1991), had considered and agreed to the proposal as a draft programme plan for such studies, and had suggested combining the planned workshops and seminars of this programme with other relevant activities of the Commission (Document ICC/OPC-IV/3S).

46 A large number of Delegates supported the proposal to develop the scientific rationale required for the proper understanding of the conditions in the transition zone from the land to the open seas. This is, however, also the zone where human activities and influences are concentrated, and several

Delegates, while appreciating the high scientific value of the draft programme plan, emphasized the need: (i) to relate it to the activities of relevant working groups of the Intergovernmental Panel on Climate Change (IPCC), for which such a programme will serve for assessing the impact of a possible climate change on the coastal zone and for providing scientific guidance on possible response strategies; (ii) to draw on the experience and results gained from earlier or on-going ocean-circulation studies related to living marine resources (OSLR) being carried out by IOC subsidiary bodies, particularly those for the Mediterranean, the Western Pacific and the Caribbean and Adjacent Regions and to liaise closely with relevant on-going projects in these regions; and (iii) to take into account possible legal and socio-economic and other aspects in the further planning of the programme, in co-operation with other related programmes, e.g., the IGBP programme on Land-Ocean Interaction in the Coastal Zone (LOICZ).

7 Some Delegates, noting the considerable importance of the proposed programme plan for the envisaged global coastal-zone and shelf-seas observing system, cautioned against moving ahead too fast, and stressed the need to take into account the views of all relevant subsidiary bodies of the Commission before deciding on the establishment of a new group of experts to guide the further development and implementation of such a long-term global activity. Many Delegates requested the Secretary to take steps to ensure the effective and timely contribution of the subsidiary bodies concerned, and to take national needs into account.

The Assembly instructed the Secretary to organize, pursuant to Resolution XV-3, the first workshop later in 1991, using extrabudgetary resources when available, and to bring to the attention of the Twenty-fifth Session of the Executive Council (Paris, 10-18 March 1992), the recommendations of the workshop, together with the comments and suggestions, if possible, of the subsidiary bodies, on the appropriate actions to develop and implement further elements of the proposed programme in the biennium of 1992-93.

5.1.6 Other Climate and Global Change Related Ocean Studies

The Secretary IOC, following instructions of the Fifteenth Session of the Assembly (Resolution XV-6), informed the ICSU and IGBP Secretariats of the broad range of IOC programmes prepared to contribute to IGBP climate and global change programme activities. This was restated at the Second Meeting of the Advisory Committee for the IGBP (Paris, 8-9 September 1990). A relevant brochure is under preparation and will be reviewed by the Chairman of IOC for distribution to interested Member States and organizations.

The IOC Assembly took note of the completion of the work of several regional task teams, supported by UNEP and IOC to provide the scientific input, the data basis and the interpretation of related science and service activities, so as to identify potential impacts of possible climate change on coastal zones, and to help guide the development of response strategies.

The Assembly also took note of the relationship with, and potential contribution of, other IOC programmes, such as OSLR, IODE and TEMA, to several established and proposed IGBP programmes and projects, which are also planned to contribute to the work of the Intergovernmental Panel on Climate Change (IPCC).

5.1.7 The Second World Climate Conference and the Intergovernmental Panel on Climate Change

The Secretary IOC referred to the Action Paper (Document IOC-XVI/8, section 5.1.7), which provides extracts from statements at the Second World Climate Conference (Geneva, 29 October - 7 November 1990), which he attended as Executive Head of one of the co-sponsoring organizations, together with other staff members. Following a meeting (7 November 1990) of co-sponsoring organizations, an intersecretariat group was formed to consider action on future co-ordination and joint sponsorship, including responsibilities and financial input, to the second phase of the World Climate Programme (WCP), to be discussed at a next meeting (22 March 1991) of Executive Heads of the co-sponsoring organizations of the SWCC. The Secretary IOC also informed the Assembly of offers of the IOC to provide input to the work of the IPCC and the participation of IOC programmes therein.

53 The Representative of WMO informed the Assembly that the forthcoming Eleventh WMO Congress (Geneva, May 1991) will consider proposals for restructuring the WCP and for broadening its sponsorship base. He welcomed a possible offer by IOC to co-sponsor the WCP and the information that IOC Member States, jointly with WMO, UNEP and ICSU, are willing to mobilize human and financial resources in support of the WCP. He expressed the opinion that the WMO Congress would consider such an offer favourably.

54 The Assembly strongly supported the idea that the IOC offer to become a co-sponsor of the WCP, and its related structures, and urged Member States to ensure, at the national level, relevant mechanisms to strengthen co-ordination of ocean and coastal marine research, monitoring, data provision and future impact studies.

55 Many Delegates pointed to the fact that IOC programmes, besides contributing to WCP, also help to achieve important goals such as effective coastal management, sustainable development of living marine resources, and to protect the marine environment.

56 The Assembly therefore strongly emphasized the need to indicate, to WMO and UNEP and to the Chairman of the Intergovernmental Panel on Climate Change, IOC's willingness to help mobilize the oceanographic community, in collaboration with the Advisory Bodies of the Commission, in the pursuit of scientific and technical assessments of climate-change issues; for example, the important role of the ocean as a sink for CO_2, and the sea-ice feedback relation, and other relevant goals of IPCC Working Groups.

57 The Assembly also emphasized the importance of continued active IOC involvement in the work of the IPCC in the prosecution of its scientific assessment of the vulnerability of countries, particularly developing countries, to sea-level changes, and expressed the wish of IOC to co-sponsor the IPCC, if possible; it requested the Secretary to investigate this further.

58 The Assembly adopted Resolution XVI-3.

5.1.8 IGBP Ocean-Related Projects (including JGOFS)

59 The Chairman of the IOC Committee for the Global Investigation of Pollution in the Marine Environment (GIPME), Dr. Neil Andersen, introduced this Agenda Item, referring also to IOC's participation (through IODE) in the work of the IGBP Data and Information Systems (DIS). He informed the Assembly of the state of the established IGBP Core Projects of special interest to IOC, such as JGOFS and PAGES, and on the proposed project on Land-Ocean Interaction in the Coastal Zone (LOICZ).

60 The President of SCOR welcomed the interaction taking place with IOC since the early planning phase of JGOFS; however, he stressed the need to clarify how the Commission co-operates with the Interagency Resource Panel in support of IGBP.

61 The Chairman of the IOC Committee on IODE reported on co-operation with ICSU and particularly with the ICSU World Data Centre Panel, and the JGOFS Group of Experts on Data Management. The next edition of the Manual for International Oceanographic Data Exchange will be a joint publication of IOC and ICSU.

62 Referring to paragraph 78 of the Action Paper (Document IOC-XVI/8), the Chairman of IOC requested officers of the Commission to consider, intersessionally, specific co-ordination mechanisms for IOC participation in large-scale ocean research programmes.

5.2 OCEAN SCIENCE IN RELATION TO LIVING RESOURCES (OSLR)

63 The Senior Assistant Secretary, Dr. Tom Osborn, charged with the development of this Joint IOC-FAO Programme, introduced the item, referring to Documents IOC-XVI/6 and XVI/8 (sections 1.2 and 5.2, respectively) and Resolution EC-XXIII.1 of the Twenty-third Session of the Executive Council (Paris, 7-14 March 1990).

64 Preparations for the joint SCOR-IOC Workshop on Ecosystem Dynamics are well advanced, with the meeting scheduled for 29 April to 3 May, 1991. The dynamics of secondary production, and the interaction of that production with fish are being specifically considered. Progress could be made on these problems through the co-ordination of international scientific expertise. One can foresee understanding, in a qu ntifiable and predictable fashion, the relation between phytoplankton, zooplankton, and fish - obviously a long-term goal. Since SCOR is involved in the planning of this programme, which is being developed in response to the wish of many Member States, appropriate co-ordination with developments in the ICSU-IGBP and in other international agencies can be ensured.

65 In March 1990, a presentation to the Twenty-third Session of the Executive Council described the Continuous Plankton Recorder Survey in the North Atlantic, outlined new initiatives for restructuring and re-invigorating the Survey as an internationally funded programme, and sought the support and advice of the IOC in implementing these initiatives. This proposal was accepted, with the IOC offering to act as a co-sponsor of the Survey, agreeing to contribute money and to nominate a representative to the Managing Council of the Sir Alister Hardy Foundation for Ocean Sciences which was formally incorporated 29 November 1990. The IOC is logically the organization to develop a long-term relationship as sponsor of this activity - facilitating its expansion and growth into a world-wide system and sustaining the 60-year data record that already exists. This activity also provides invaluable input to the Ecosystem Dynamics initiatives.

66 Planning for the OSLR Programme on Algal Blooms and Related Processes has proceeded from the IOC Workshop on International Co-operation in the Study of Red Tides and Ocean Blooms (Takamatsu, Japan, 1987) and a meeting of an *ad hoc* Group of Experts in Paris (January 1990).

67 The Representative of FAO confirmed the full support given by his organization to this joint programme. It is hoped that the OSLR activities will help to better understand influences of environmental factors and ecosystem dynamics on fishery resources. Such knowledge is fundamental for the sustainable development of fisheries and balanced coastal-zone management. In this sense, FAO is looking forward to a continued fruitful co-operation with IOC, in particular at the level of the regional subsidiary bodies of the two co-sponsors of the OSLR programme.

68 The General Secretary of the International Council for the Exploration of the Sea (ICES) expressed his organization's interest in OSLR activities in the North Atlantic; he noted the joint IOC-ICES Symposium on the Sardine-Anchovy Recruitment Project (SARP) at the time of the 1991 ICES Statutory meeting, and suggested the development of a formal relationship for ICES in OSLR.

69 The Assembly expressed strong support for the OSLR Programme and many Member States elaborated on their participation in OSLR. The development of an OSLR sub-programme on Marine Ecosystem Dynamics and Living Resources, and the initiation of the Sub-programme on Algal Blooms and Related Processes were seen as valuable endeavours. Many Delegates expressed their support of activities relating to algal blooms. It was, however, stressed that harmful effects are not only caused by blooms but also by certain algal species e' 'n at very low densities. SARP and the Prawn Recruitment Project (PREP) also received strong support. Some Delegates requested accelerated implementation at regional level, and more OSLR activity in the IOCINDIO, IOCEA and IOCARIBE regions was requested.

70 The Assembly agreed to establish an *Ad hoc* Intergovernmental Panel on Harmful Algal Blooms.

71 The Assembly endorsed a plan for a workshop on global ecosystem dynamics which should, *inter alia*, develop the scientific basis for an OSLR Sub-Programme on Ecosystem Dynamics and Living Resources, and welcomed the offer of SCOR to co-sponsor this Workshop. The Assembly agreed that the IOC should await the results of this Workshop before deciding on IOC's long-term approach to developing a programme in this area.

72 The Delegate of Venezuela informed the Assembly of his country's offer to host a Workshop on Algal Blooms and Fish Mortality, in 1992. The Assembly thanked Venezuela for this kind offer.

73 The Assembly acknowledged the importance of co-operation with FAO in the programme and the interaction with the FAO Secretariat.

74 The Assembly instructed the Secretary to study, with the General Secretary of ICES, the possibilities for more formal involvement of ICES in OSLR.

75 The Assembly put on record its appreciation of the USA's secondment of an expert, Dr. Tom Osborn, to the IOC Secretariat.

76 The Assembly recognized that the IOC's organizational structure for addressing OSLR issues is complex and should be reviewed at the Seventeenth Session of the Assembly.

77 The Assembly adopted Resolution XVI-4.

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

78 The Chairman of the IOC-UN(OALOS) Guiding Group of Experts on OSNLR, Prof. Michel Vigneaux, introduced this item, referring to Document IOC/INF-839 for detailed information on the development of the OSNLR Programme at the regional level and on the Draft Action Plan for 1991-1993. Most of the Commission's regional/sub-regional bodies have set up OSNLR regional components, but there is a little delay in the regions of IOCINDIO and IOCINCWIO. Some of these regional components were established in co-operation with other intergovernmental organizations, such as ICSEM and CPPS. In all regions, the operational efforts were successful with respect to the coastal-change sub-programme, particularly in the IOCEA region. A regional cruise in the Gulf of Guinea was carried out as a key element of such a regional project and was a good example of regional co-operation (Document IOC/INF-846).

79 Regarding the sub-programme on Continental Margin Environments and Mineral Resources (COMEMIR), the Chairman of the Guiding Group of Experts informed the Assembly that an action plan with an order of priority of target areas (e.g., current systems off Peru/Chile, the Canaries, South-west Africa and Brazil) was prepared by the project sub-committee in November 1990.

80 A regional project on Margins of Active Plates (MAP) has been developed in the WESTPAC region as a deep-sea sub-programme. Efforts are being made to involve scientists from developing Member States in studies of palaeo-oceanographic reconstruction. To this end, the IOC Secretariat, in close collaboration with officers of the Programme and relevant experts, is seeking possible ways to facilitate the development of an Ocean Drilling Programme (ODP) Third-World Consortium.

81 Taking into account the interest of the OSNLR Guiding Group of Experts and of the Commission's regional subsidiary bodies in the coastal zone, the Chairman of OSNLR informed the Assembly that the OSNLR Officers had identified the importance of coastal-change phenomena, and proposed to organize an international conference on "Coastal Change: Past, Present and Future" to document past and present rates of change and define response strategies for dealing with unavoidable changes in the future.

82 The Assembly expressed its satisfaction with the progress made during the intersessional period, particularly in the regional components of the OSNLR Programme summarized in Document IOC/INF-839. The Assembly agreed that it is an adequate approach to encourage participation of developing Member States in OSNLR's sub-programme on coastal changes. The Assembly emphasized that coastal erosion, as well as changes in sedimentation conditions, are serious problems for most of developing countries and provide good examples for modelling environmental changes at the land/sea interface.

83 The Assembly also expressed its support for the sub-programme on Continental Margin Environments and Mineral Resources (COMEMIR) which attempts to determine the global environmental change records in continental margin sediments and to assess their mineral resources.

84 Some Delegates stated that interdisciplinary research on marine sediments, especially of their upper part (last glacial/post-glacial deposits) and a comprehensive synthesis of research results will provide better understanding of global sedimentary processes; such studies could be done as appropriate contributions to IGBP since marine sediments are considered as key indicators of climatic and environmental changes in the past. The Delegates felt that it was timely to organize the international conference on coastal change proposed above, and to seek the best ways and means to utilize the coastal zone, as well as to conserve coastal environments for the future.

85 The Assembly accepted the Report on the Programme and the proposed actions summarized in Document IOC/INF-839 and instructed the Secretary to provide, to the extent possible, necessary resources to ensure full implementation of the proposed action plan. It endorsed, in principle, the proposed conference on coastal change and requested the Chairman of the Guiding Group of Experts on OSNLR to provide a detailed plan to the Twenty-fifth Session of the Executive Council.

86 Several Delegates expressed their concern that not much attention was paid to deep-sea research, such as geological features of the ridge system, which will open-up possibilities for future resources. Several Delegates pointed out the importance of maintaining close co-operation with other organizations (e.g., EEC) and programmes (e.g., those of the Circum-Pacific Council for Mineral Resources) so as to use available resources and means efficiently and to avoid duplication of effort.

87 The Delegate of the United Kingdom informed the Assembly that his Government will consider providing staff support to the Secretariat to help service the OSNLR Programme.

88 The Delegate of Cuba strongly supported the proposal to organize a conference on coastal changes. He informed the Assembly that his Government would wish to host such a conference in 1993, on the occasion of the celebration of the Third Congress on Marine Science being organized in Cuba in that year.

89 The Assembly recognized the importance of active participation of developing Member States in regional projects of the Programme and requested the Secretary to take appropriate steps to encourage participation of developing Member States in them.

90 The Assembly also requested the Secretary to ensure that progress in programme implementation be reported regularly to the Assembly or the Executive Council.

91 The Assembly expressed its appreciation to the Delegates of the United Kingdom and Cuba for their generous offers and instructed the Secretary to follow them up, including the invitation to other organizations to co-sponsor the proposed conference on coastal changes.

5.4 OCEAN MAPPING

92 The Chairman of the IOC Consultative Group on Ocean Mapping (CGOM), Mr. Desmond P.D. Scott, presented the Report of the CGOM to the Sixteenth Session of the IOC Assembly (Document IOC/INF-822) and the Summary Report of the Fourth Session of the CGOM (Monte Carlo, 22-24 October 1990; Document IOC/CGOM-IV/3) which together summarized information on the implementation of the IOC's Ocean Mapping Programme: the General Bathymetric Chart of the Oceans (GEBCO), the Regional Ocean Mapping Projects and the International Geological/Geophysical Atlases of the Atlantic and Pacific Oceans (GAPA).

93 Mr. Scott recalled that GEBCO is a Joint IOC-IHO project and paid tribute to the International Hydrographic Organization for the excellent close collaboration enjoyed with that Organization.

94 In support of the digital database, the "GEBCO Digital Atlas", the United Kingdom Government, through its Natural Environment Research Council (NERC), has agreed to fund, for an initial period of four years, posts of a GEBCO Bathymetric Editor, a GEBCO Digital Atlas Manager, and a Research Project at the NERC Unit of Thematic Information Services (NUTIS) in Reading University, UK, to provide advice on the development of the GEBCO Digital Atlas.

95 The International Geological/Geophysical Atlas of the Atlantic Ocean has now been published and the Pacific volume is in a good state of compilation.

96 The International Bathymetric Chart of the Mediterranean (IBCM) and its Geological/Geophysical Series is the most advanced of the regional projects. Following its publication, the Bathymetric Chart was digitized and is now available on magnetic tape. The Bouguer Gravity Anomaly Series was published in 1989 and the Seismicity Series was published very recently (March 1991).

97 The first sheet of the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA) is now complete. The Delegate of Mexico reaffirmed his country's intention to continue to take the lead in the production of IBCCA.

98 The International Bathymetric Chart of the Central Eastern Atlantic (IBCEA) and the International Bathymetric Chart of the Western Indian Ocean (IBCWIO) are in the stage of collecting and processing data.

99 A meeting of the IOC *ad hoc* Group of Experts on Ocean Mapping in the WESTPAC Region (Tianjin, People's Republic of China, 12-14 June 1990) (Doc. IOC/GE-IBCWP-I/3) recommended that the Commission undertake the preparation of an International Bathymetric Chart of the Western Pacific (IBCWP).

100 The Delegate of China informed the Assembly of his country's offer to prepare and publish bathymetric sheets for some sub-regions of the International Bathymetric Chart of the Western Pacific. The Assembly thanked China for this kind offer.

101 The Assembly adopted Resolution XVI-5 on this specific subject.

102 The Assembly endorsed the Report of the Consultative Group on Ocean Mapping to the Sixteenth Session of the IOC Assembly together with its corrigendum and the recommendations of the regional projects reproduced in Annex II of the Report (subject to the comments of the CGOM), and the Summary Report of the Fourth Session of the IOC Consultative Group on Ocean Mapping.

103 The Assembly expressed its satisfaction with the IOC Ocean Mapping Programme and with the strong support being given by the Member States to the activities of the Commission in this field.

104 However, some Delegates expressed their concern that the preparation of an International Bathymetric Chart of the Central Indian Ocean has not yet been initiated.

105 The Assembly expressed its sincere appreciation to the Government of the United Kingdom for the support provided to GEBCO by funding two posts and a Research Project.

106 The Assembly thanked the Government of the USSR for the secondment of a senior staff member to the Secretariat and expressed the hope that this secondment will be continued.

107 The Representative of FAO introduced a proposal on the preparation of a data base on shelf areas for estimation and comparison of fisheries production and other purposes (Doc. IOC-XVI/Inf.6). He recalled that the proposal was discussed briefly at the Twenty-third Session of the Executive Council and at an *ad hoc* Meeting of the Members of the Editorial Board of the IBCM (October 1990), and subsequently circulated to Members of CGOM.

108 The objectives of the proposed project are, for GFCM and FAO, inter-regional comparison of: fish production per unit area of sea bed or per unit volume of sea water, over the continental shelf, particularly the coastal zone; likewise for fishing intensity; and for studies of the distribution of nursery grounds, and of the nature of inshore/offshore migration. The concomitant creation of appropriate data bases (bathymetric and other parameters to be related to bathymetry) and subsequent digital terrain models of the coastal zone would be necessary.

109 For other bodies, especially IOC, the subjects of interest to be related to coastal bathymetry are: sedimentation/erosion, pollutant dispersion, coastal navigation, coastal construction, assessing the effect of global warming (especially sea-level rise) on the coastal zone and the new IOC programmes of coastal ocean dynamics and fluxes and integrated coastal-area management.

110 The GFCM area is proposed as a pilot region with subsequent extension to other regions. At this stage, GFCM needs advice from IOC and IHO, *inter alia*, as to how best to proceed towards achievement of the proposed objectives. This might include, in due course, the creation of an *ad hoc* Working Group to supervise the eventual implementation of this proposed project.

111 **The Assembly welcomed the proposal and requested** the Editorial Board for the IBCM and the Consultative Group on Ocean Mapping formally to advise GFCM on how best to proceed in the execution of the proposed pilot project including advice on: effective mechanisms for assembling the data base, preparing relevant software (if not already available), keeping the data base up to date, and the preparation and printing of relevant charts, taking into account on-going IOC-IHO regional mapping activities.

112 **The Assembly also suggested** that ICSEM might wish to collaborate in the proposed projects, the implications of which will go well beyond strictly ocean-mapping aspects.

113 Mr. Scott also presented a paper "International Study of the Equatorial Segment of the Mid-Atlantic Ridge (EQUARIDGE)" (Doc. IOC/INF-850).

114 He recalled that the EQUARIDGE Project was submitted by the Academy of Sciences of the USSR to the IOC Executive Council at its Twenty-third Session (Paris, 7-14 March 1990). The Executive Council expressed its support for the project and requested the Delegate of the USSR to keep the IOC informed of the scientific results achieved.

115 The Project has a truly international character and has brought together and ensured co-operation between scientists of Brazil, Germany, Israel, the United Kingdom, USSR and USA.

116 Preliminary results of the first EQUARIDGE cruise of the RV ACADEMIK NIKOLAI STRAKHOV were discussed by an *ad hoc* sessional working group and highly appreciated.

117 **The Assembly supported** a proposal to discuss the results of the EQUARIDGE project, after the processed data have been reviewed, at a special symposium which could be held in the Institute of Geophysics of the University of Hamburg, Germany, in mid-1992.

5.5 MARINE POLLUTION RESEARCH AND MONITORING (GIPME/MARPOLMON) AND RELATED PROGRAMMES

118 The Chairman of the Committee for GIPME, Dr. Neil Andersen, introduced this Agenda Item. He referred to the Secretary's Report (Document IOC-XVI/6), the Report of the Seventh Session of the Committee for GIPME (Paris, 21-25 January 1991) (Document IOC/GIPME-VII/3) and the Second GIPME Action Plan (Document IOC-XVI/8 Annex 2).

119 Work within the three groups of experts has made considerable progress. The Joint Meeting of the Groups of Experts on Methods, Standards and Intercalibration (GEMSI), and on Effects of Pollutants (GEEP) (Moscow, 15-19 October 1990) had presented the opportunity to focus on interactions of those groups as well as the interaction with the Group of Experts on Standards and Reference Materials

(GESREM), and arrive at joint planning of major workshops, training courses and integrated programmes of quality assurance to take place at appropriate developing-country sites during the next intersessional period.

120 These considerations provide the basis for developing a GIPME Action Plan for the next several years, which was revised and approved by the Seventh Session of the Committee for GIPME.

121 The Seventh Session of the Committee reviewed the Marine Pollution Monitoring System (MARPOLMON), which comprises programmes addressing regional-sea issues. It should be identified as GIPME's operational contribution to marine environmental monitoring systems with the objective of developing the level of understanding of marine and coastal ecosystems, and to provide data bases for and arrive at assessments.

122 He stressed that a direct, basic input from the countries concerned in the regions, to an extent far greater than in the past, was most important for the further and accelerated development of MARPOLMON.

123 He noted that, through GIPME, assistance had been provided by IOC to SCOR in implementing the Joint Global Ocean Flux Study (JGOFS); this included the development of protocols for JGOFS measurements, and contributions to the planning of the JGOFS Northern Indian Ocean Process Study, including facilitating participation of countries of the region in this planning.

124 The Assembly noted that the Committee for GIPME had recommended that high priority be given to ensuring that results and experience, as well as future aspects of the GIPME Programme, be fully taken into account in developing an IOC contribution to UNCED.

125 The Assembly expressed its full satisfaction with the accomplishment of the GIPME Programme in general and the outcome of the Seventh Session of the Committee for GIPME in particular. Many Delegates made specific references to their country's involvement in various MARPOLMON activities in their region emphasizing especially those related to TEMA.

126 The Assembly expressed strong support for the establishment of the Joint IOC-UNEP Intergovernmental Panel on GIPME and several Delegates indicated their preparedness to serve on it when it becomes operational.

127 The Delegate of Canada expressed concern over potential duplication between the Committee for GIPME and the IOC-UNEP Intergovernmental Panel and urged that efforts be made to guard against this. He further informed the Assembly that his country is considering providing a research vessel, possibly in 1992, for the continuation of the Open-Ocean Baseline Study in the Western Atlantic.

128 The Assembly stressed the need to maintain and further improve co-operation with UNEP, the International Atomic Energy Agency (IAEA), SCOR and other global and regional bodies.

129 The Delegate of China reaffirmed his country's readiness to host the Workshop on Biological Effects of Pollution, in Xiamen, and requested the Secretariat to endeavour to implement this activity in 1991 or 1992.

130 The Delegate of Cuba indicated the willingness of his country to host the Workshop on Benthic Community Analysis proposed by the Committee for GIPME. He also stressed the importance of Analytical Quality Control, and proposed that IOC co-sponsor a workshop on this problem and its application to the analysis of heavy metals in marine sediments, scheduled for June 1993, in Havana, pursuant to an agreement between the IAEA and the Instituto de Oceanología of Cuba.

131 The Delegate of Brazil informed the Assembly that an Intercalibration Exercise on Organic Contaminants, supported by IOC and IAEA, was being implemented and offered to host a Training Workshop on Hydrocarbon Analysis.

132 The Delegate of the USA informed the Assembly of his country's continued support to the International Musselwatch Programme.

133 The Delegate of the Ukraine expressed his satisfaction with the reference made to the UNEP-IOC Action Plan for the Black Sea in the Summary Report of the Seventh Session of the Committee for GIPME and requested that the study of levels and migration of radionuclides in the Black Sea ecosystem, possibly through the UNESCO Chernobyl Project, also be included in the scientific programme of the Action Plan.

134 The Assembly noted the activities already undertaken in respect of the Black Sea Project, pursuant to Resolution EC-XXIII.4.

135 The Assembly also noted the agreement reached at the Twenty-eighth Session of the Inter-secretariat Committee on Scientific Programmes Relating to Oceanography (ICSPRO) that IOC will play the leading role as a technical co-ordinating body and joint specialized mechanism in the elaboration and implementation of a scientific research and monitoring component of the Black Sea Action Plan.

136 The Representative of ICES expressed his appreciation of the invitation by the IOC Executive Council to his Organization to participate in the Joint IOC-UNEP Intergovernmental Panel on GIPME. He stressed that examples of co-operation with IOC in activities related to marine pollution, such as the North Sea Sea-going Workshop on Biological Effects (March 1990), had proved very successful. ICES fully supported the maintenance and further development of co-operation with IOC in the field of marine pollution research and monitoring.

137 The Assembly noted with appreciation the offers made by the Delegations of China, Cuba and Brazil to host various workshops in their respective countries and thanked Canada for considering the possibility of offering shiptime for the continuation of the Open-Ocean Baseline Study.

138 The Assembly also acknowledged the generous financial support of the USA to the International Musselwatch Programme.

139 The Assembly accepted the Summary Report of the Seventh Session of the Committee for GIPME and approved its Recommendations; it also endorsed the GIPME Action Plan. It urged Member States and other organizations and bodies to strengthen their efforts to identify the increased resources required for the implementation of the GIPME Action Plan and the accelerated development of the MARPOLMON system.

140 The Assembly adopted Resolutions XVI-6 and 7.

5.6 MARINE ACOUSTICS

141 Dr. Brian McCartney, the Rapporteur of the IOC-SOA International Workshop on Marine Acoustics (Beijing, 26-30 March 1990), introduced the Agenda Item, referring to Document IOC-XVI/8, section 5.6. He reported to the Assembly the outcome of the Workshop, with that of the scientific conference and an expert consultation, which has been published as IOC Workshop Report No.68.

142 He stressed the benefit of international co-operation in the application of marine acoustics to many of the scientific programmes of the IOC, and especially with respect to the development of the Global Ocean Observing System.

143 The Delegate of Canada stressed the importance of looking at small-scale studies of ocean processes, as well as those relating to long-range propagation.

144 Some Delegates, considering the importance of acoustic techniques and the narrow focus of the SCOR Working Group, suggested that IOC should establish a Group of Experts in this field.

145 A number of Delegates expressed their concerns over the establishment of a Group of Experts, since the SCOR Working Group on Acoustic Monitoring of the World Ocean has been approved. Duplication of efforts should be avoided.

146 The President of SCOR clarified that the SCOR Working Group on Acoustic Monitoring of the World Ocean was now being formed and that its Terms of Reference were limited in scope, mainly covering tomography and long-range propagation of sound waves, with an emphasis on using acoustics in monitoring global climate change in the ocean. Thus, the SCOR Working Group would in no way try to cover the wide-range of use of acoustic techniques (e.g. for fisheries) in ocean research.

147 The Assembly expressed its appreciation to the People's Republic of China for having supported and hosted the Workshop.

148 The Assembly noted the importance of the application of marine acoustics to many on-going programmes of the IOC; it also noted the discussion in the IOC Committee on Ocean Processes and Climate on this subject.

149 The Assembly suggested that the Terms of Reference for the suggested IOC Group of Experts needed to be more focussed and specific, and ensure that no overlap would occur with the now established SCOR Working Group.

150 The Assembly took note of the important review by the International Workshop on Marine Acoustics and instructed the Secretary IOC to further study the matter, in consultation with SCOR as a scientific advisory body of IOC, including consideration of the Terms of Reference of the SCOR Working Group, to identify possible needs to be covered by an IOC Group of Experts, and to prepare specific and focussed draft Terms of Reference for such a Group of Experts, to be presented to the Twenty-fifth Session of the Executive Council.

6. OCEAN SERVICES

6.1 GLOBAL OCEAN OBSERVING SYSTEMS

6.1.1 Global Ocean Observing System (GOOS)

151 The Chairman of the *ad hoc* Group of Experts on an Ocean Observing System, Mr. Geoffrey Holland, presented a summary of the intersessional activities. He noted that, because of its scope and magnitude, the Global Ocean Observing System (GOOS) can be discussed in relation to many of the Assembly's Agenda Items.

152 He pointed out that GOOS is not a new concept, but there are now new demands and new opportunities. Capabilities are improving; TOGA and WOCE are demonstrating the feasibility of gathering synoptic data sets; changes in the coastal environment and potential climate changes are causing global concern; and the 1992 United Nations Conference on Environment and Development offers a historic forum for these topics. The Second World Climate Conference (Geneva, 29 October - 7 November 1990; see Section 5.1.7) proved to be a significant milestone with its recommendation for a Global Climate-Observing System to include land, air and ocean parameters and specifically the establishment of a Global Ocean Observing System. He summarized the recommendations of the *ad hoc* Group of Experts Meeting (Washington D.C., 6-7 September 1990; Document IOC/INF-829) which included the accelerated development of existing systems, the development of a Strategy (Document IOC-XVI/8 Annex 3), and the preparation of an "annex", or declaration, to foster commitment among countries. Recommendations were also addressed to other IOC and WMO bodies on improvements to existing systems. He emphasized the importance of TOGA and WOCE for providing the scientific basis for climate aspects of GOOS and, in particular, the work now underway by the CCCO-JSC Ocean Observing System Development Panel (Document CCCO-JSC/OOSDP-I/3).

153 He distinguished three initiatives: (i) the Global Ocean Observing System (described above), (ii) the Global System of Monitoring Coastal and Near-Shore Phenomena Related to Climate Change, described in Section 6.1.3 of this report, which will be a component of GOOS; and (iii) the Global Climate Observing System (GCOS). The latter was discussed at a Workshop co-sponsored by WMO, ICSU and IOC and convened by the Chairman of the Joint Scientific Committee for the World Climate Research Programme, in Winchester, U.K., 14-15 January 1991, where the establishment of a GCOS Steering Committee and a GCOS Planning Office was recommended.

154 The Fourth Session of the Committee on Ocean Processes and Climate (Paris, 27 February-1 March 1991; Document IOC/OPC-IV/3S) discussed GOOS and options for organizational supervision of GOOS development. The Committee recommended that it carry out this function, recognizing that an intergovernmental panel may be needed once GOOS development advances. The Committee also discussed options for formal agreements to be sought for GOOS through UNCED.

155 The Assembly expressed unanimous support for the development of a comprehensive Global Ocean Observing System, built initially on existing systems and operated by Member States for the needs and benefits of each. GOOS will be a highly complex and sophisticated undertaking and one of the most important activities ever undertaken by the IOC, representing indeed a new era in oceanography. The Assembly stressed the importance of partnerships, citing the IGOSS system as an example of an established mechanism co-ordinated between IOC and WMO. Organizations such as UNEP, and the United Nations Earthwatch, the UNEP Global Environmental Monitoring System (GEMS), ICSU and satellite agencies must also be closely involved.

156 The Assembly also stressed the importance of an integrated approach that would ensure that the activities under different programmes and in different regions and on specific phenomena are fully considered and co-ordinated synergistically. Such an approach would include elements such as climate observations, MARPOLMON, coastal-zone monitoring and regional programmes as "modules" or "sub-systems" of the overall system. Enclosed and semi-enclosed seas would also be included in such a modular approach.

157 The Assembly emphasized the view that GOOS will also serve as the ocean component of the proposed Global Climate Observing System, besides contributing to Earthwatch. The Assembly agreed that support for global climate monitoring, research and prediction, building on the results of TOGA in particular, should be one of the initial priorities for the System. The Representative of WMO concurred with this interpretation.

158 The Assembly noted the serious concerns of a number of Member States eager to participate that limited resources will prevent their substantial participation. The Assembly therefore stressed that ways and means of implementation must be carefully considered. The Assembly agreed that training and assistance will be necessary, as well as appropriate transfer of technology, in order to ensure the involvement of all Member States. Analytical and data-processing tools must also be made available to ensure that the relevant data and information can be used and be of benefit at the local level. The Assembly noted the importance of the free, open and timely exchange of data and information. Products of the system likewise need to be made freely available for all participants. The Assembly agreed that the Committee on Ocean Processes and Climate should provide the initial supervision of GOOS, but that appropriate structures for long-term supervision should be designed in due course.

159 The Assembly noted the preparation of the first Status Report on Existing Elements of an Ocean Observing System (Document IOC/INF-833), and expressed its appreciation of the Secretariat's efforts to prepare the Status Report.

160 The Assembly agreed to establish a Support Office within the IOC Secretariat for the development of GOOS. The Assembly welcomed offers by the United Kingdom and United States to second personnel to the Support Office. The Assembly noted that the scope and magnitude of GOOS is such that Member States must make national commitments, in addition to UNESCO contributions. The Assembly expressed the hope that the establishment of GOOS will facilitate the generation of funds for operational oceanographic activities. Many Delegates also noted the need to establish appropriate national

organizational structures in close co-ordination with meteorological services to ensure effective co-operation at all levels.

161 The Assembly adopted Resolution XVI-8.

162 The Assembly also adopted Resolution XVI-16 (see section 10) which invites the UNCED to adopt a "Declaration on a Global Ocean Observing System" submitted by the Assembly, the objective of such action being to foster participation in a Global Ocean Observing System by all countries. The Assembly instructed the Secretary to transmit this Declaration to all Member States with the request to solicit support for this action among the national representatives to UNCED.

6.1.2 Global Sea-Level Observing System (GLOSS)

163 The Chairman of the IOC Group of Experts on GLOSS, Dr. David Pugh, reported on the progress in the implementation of GLOSS. He reviewed GLOSS activities carried out during the intersessional period and particularly referred to the outcome and recommendations of the Second Session of the Group of Experts (Miami, 22-26 October 1990; Document IOC/GE-GLOSS-II/3), which were considered and endorsed at the Fourth Session of the IOC Committee on Ocean Processes and Climate (Paris, 27 February-1 March 1991; Document IOC/TC-OPC-IV/3S). Dr. Pugh also presented a brief summary of the status of the GLOSS network and, in particular, noted that of 306 GLOSS stations, about 220 are working or committed, but about 50 of the remaining 86 stations are located in hazardous areas such as polar regions and isolated islands.

164 Referring to the GLOSS Implementation Plan, he stressed some basic needs which should be taken into consideration: further development of national and regional components, strengthening of training and technical assistance components, timely submission of data and products, etc.

165 The Assembly noted with satisfaction the progress in GLOSS development achieved mainly through support of, and active participation by, the Member States.

166 Many Delegates reported on their GLOSS activities and emphasized the importance of GLOSS as one of the basic components of the Global Ocean Observing System (GOOS) and the global coastal monitoring system (see section 6.1.3). The Representative of WMO stressed the value of sea-level data to climate studies, as demonstrated by the monthly sea-level products prepared and widely distributed by the Specialized Oceanographic Centre for the IGOSS Sea-Level Programme in the Pacific.

167 The Assembly noted with appreciation that GLOSS could be considered as a good example of effective co-operation between the majority of the IOC Member States in a global observing system.

168 The Assembly welcomed the activities and plans of Australia, Brazil, Indonesia, Iran, Israel, Spain and Sri Lanka for improvement of the GLOSS network by installation of sea-level measuring systems and modernization of old ones. Bearing in mind the recommendations of the IOC Workshop on Sea- Level Measurements in the Antarctic (Leningrad, USSR, 28-31 May 1990; Document IOC Workshop Report 69), the Assembly welcomed the efforts of Denmark aimed at developing the GLOSS network in the Arctic, and of Japan, in the Antarctic.

169 Some Delegates pointed out the need to develop regional components of the GLOSS network in the enclosed and semi-enclosed seas (Mediterranean, Black Sea, Caspian Sea, Caribbean and Adjacent Regions, etc.). The Assembly welcomed this proposal and invited the IOC Group of Experts on GLOSS to consider it and report to the next session of the IOC Assembly.

170 Some Delegates emphasized the importance of the continuation of sea-level training courses. In this connection, the Assembly noted with satisfaction the training courses organized by France and the UK. The Assembly also welcomed the proposal of Brazil to organize a training course in Sao Paulo on the analysis of sea-level data for Spanish- and Portuguese-speaking specialists, and the renewed offer of Cuba to hold a sea-level training course in Havana for specialists from the IOCARIBE region.

The Assembly requested the Sub-Commission IOCARIBE and the Secretary of IOC to consider these proposals with a view to identifying possible support and assistance for the organization of the proposed courses.

171 The Assembly noted with satisfaction the assistance provided by Australia, Germany, Sweden and the USA to other countries in setting up and maintaining GLOSS stations.

172 Some Delegates pointed out the need to provide necessary support to the implementation of the GLOSS Work Plan, proposed by the Second Session of the Group of Experts on GLOSS and, in particular, to the IOC-SAREC-KMFRI Workshop on "Causes and Consequences of Sea-Level Changes on the Western Indian Ocean Littoral Coasts and Islands" (Mombasa, Kenya, 24-29 June 1991) and the IOC-UNEP Workshop on Impact of Sea-Level Rise on Coastal Areas, proposed to be held in Bangladesh in 1991.

173 The Assembly noted that the timely and continuous implementation of the GLOSS Work Plan would need additional financial and staff support to be provided by the IOC Secretariat and requested the Secretary IOC to give special attention to this matter.

174 The Assembly welcomed the publication and widespread distribution of the GLOSS Implementation Plan, with strong emphasis on co-operation with governmental and non-governmental organizations.

175 The Assembly noted with satisfaction the demonstration, during the Session, of the PC-version of the GLOSS Handbook produced by the Permanent Service for Mean Sea Level (PSMSL).

176 The Assembly adopted Resolution XVI-9.

6.1.3 Global Coastal Zone and Shelf Seas Observing System

177 In introducing this Item, Dr. John Pernetta, rapporteur of the UNEP-IOC-WMO Expert Meeting on this subject (Paris, 10-14 December 1990), drew the attention of the Assembly to the origin of a proposal which stemmed from a joint IOC-UNEP-WMO submission to the Twenty-third Session of the IOC Executive Council on the preparation of a master plan for a long-term global system of monitoring coastal and near-shore phenomena related to climate change.[1] The proposal, as elaborated by the Secretariats of UNEP, IOC and WMO, was considered and revised by the joint UNEP-IOC-WMO Expert Meeting. The proposal (as detailed in Annex III of the Report of that meeting, Document UNEP-IOC-WMO/GCNSMS-I/3) was considered and approved by the Fourth Session of the IOC Committee on Ocean Processes and Climate (Paris, 27 February - 1 March 1991). Implementation would be through six initial activities constituting the modest pilot phase designed to further define and develop the major elements and mode of operation of a future global monitoring system covering physical, biological and biogeochemical variables.

178 Dr. Pernetta noted that the goal of the proposed system is to contribute to global, regional and national efforts to assess climate change and the environmental and socio-economic impacts of this change and to the development and implementation of policies and measures designed to mitigate the undesirable effects of expected changes. The intention is to base the system on data generated by on-going and planned national and international systems, programmes and activities, and not to duplicate existing efforts, as well as to make use of existing networks such as those being developed by the Regional Task Teams on the Impacts of Climate Change sponsored by UNEP and IOC. Initiation of the pilot phase was considered particularly opportune in the light of the recommendations of the Second World Climate Conference and the IPCC concerning the need for enhanced coastal-zone monitoring and research.

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[1] The title of the Agenda Item predated the name adopted at the UNEP-IOC-WMO meeting; the latter is to be preferred.

179 The Assembly, after reviewing the proposal of the UNEP-IOC-WMO Expert Meeting and relevant recommendations of the Fourth Session of the IOC Committee on Ocean Processes and Climate, expressed strong support for the proposal. Many Delegates stated their desire to participate in the proposed pilot projects.

180 The Assembly recognized the importance of such a system, for monitoring and prediction of climate change, for the assessment of the environmental and socio-economic impacts of this change, and for the implementation of policies and measures designed to mitigate the undesirable effects of the expected impacts.

181 The Assembly endorsed the concept and objectives of the proposed Long-Term Global System of Monitoring Coastal and Near-shore Phenomena Related to Climate.

182 The Assembly adopted the recommendation of the Fourth Session of the IOC Committee on Ocean Processes and Climate to implement the proposed pilot activities with the continued support of UNEP, IOC and WMO, through the IOC regional bodies and the UNEP-IOC Regional Task Teams, in consultation with relevant bodies of IOC, UNEP and WMO.

183 The Assembly emphasized the need for careful co-ordination of the pilot activities with other activities and programmes of IOC, UNEP and WMO to avoid duplication of effort and to ensure efficient and optimum utilization of scarce resources. The Representative of WMO emphasized the need to undertake a careful review of the results of the pilot projects, at the end of three years, as recommended by the above-mentioned Expert Meeting, before proceeding to full project implementation.

184 The Assembly adopted Resolutions XVI-10 and XVI-11.

6.1.4 Drifting Buoy Co-operation Panel (DBCP)

185 The Assembly accepted the annual report of the Drifting Buoy Co-operation Panel and expressed its pleasure at the major successes of the Joint IOC-WMO Panel so far. These include, in the context of operational meteorology and oceanography: substantial improvements in the quality and amount of buoy data distributed globally on the GTS of WMO; for research operators of drifting buoys, assistance with communications through the Argos System and collaboration on a new low-cost drifter; and, at the regional level, direct support for various regional action groups of the Panel. This success was achieved largely through the work of the Technical Co-ordinator for the Panel, and has provided a good recompense to those countries that are contributing financial support for the Technical Co-ordinator position: Australia, Canada, France, Greece, Iceland, Ireland, The Netherlands, Norway, UK and USA.

186 The Assembly nevertheless expressed concern over the present level of funding for the Panel. Inflation, a modest increase in salary of the Technical Co-ordinator and other increasing miscellaneous costs need to be taken into account. The new processing system to be implemented at Argos processing centres to allow more and better data to be circulated globally through the Global Telecommunication System (GTS) would have to be funded, at least partly, directly by Member States. Finally, it should be kept in mind that the successes of the Panel are to the benefit of all Member States. While taking into account national difficulties in funding such new undertakings, the Assembly once again urged Member States that have not yet done so to consider contributing, even through relatively small amounts of funding, to the Panel's fund, following the recent example of The Netherlands and of Norway.

6.1.5 Integrated Global Ocean Services System (IGOSS)

187 The Assembly was informed by Mr. Dieter Kohnke of the present state of IGOSS development, in the framework of the decisions taken on the Global Ocean Observing System (see section 6.1.1, above). It was made clear that IGOSS, a joint IOC-WMO undertaking, is a precursor and a fundamental building block of GOOS. It should therefore be given a very high priority (including from the operational funding standpoint) in the development of the global ocean observing system, since it is at present the only system that provides for real-time exchange of oceanographic data. Emphasis was placed on the Seminar/Workshop on IGOSS Products, to be held in Tokyo in April 1991 at the kind

invitation of the Japan Meteorological Agency. **The Assembly considered** that this major event should take stock of present IGOSS capabilities and provide very useful guidance on the further development of, *inter alia*, the IGOSS Observing System. Furthermore, **the Assembly recognized** that, notwithstanding the work accomplished at the periodic sessions of the Joint IOC-WMO Committee for IGOSS, improvements in the System were mainly due to the continuous work of Member States, expert groups and the IGOSS Operations Co-ordinator. In this context, **the Assembly expressed its appreciation** to Dr. Carl Berman for his dedication to the implementation of IGOSS, and its thanks to the USA for the continuation of its secondment of an IGOSS Operations Co-ordinator to the IOC and WMO Secretariats.

188 **The Assembly nevertheless expressed concern** over the present sparsity of data, especially salinity data, exchanged within IGOSS to meet research (including climate) and operational requirements. **It therefore urged** Member States to realize that oceanography had to enter the era of systematic observation of the oceans, and that this would imply a quite new approach in terms of funding, national structures and intergovernmental support of the Secretariats.

6.2 PREPARATION OF GLOBAL OCEAN DATA SETS

189 The Chairman of the Committee on IODE, Dr. Nick Flemming, presented this Item. He drew attention to the task of "developing the capability to manage the large data sets mutually necessary to several programmes" (Document IOC/EC-XXIII/3 para 75), and described the activities of the IODE programme, and other components of IOC insofar as they contribute to the creation and management of Global Ocean Data Sets.

190 A large number of documents before the Assembly referred to the need for global-scale data sets of different variables or combinations of variables, in different contexts, and in real time, delayed mode, and as historical archives (see Documents IOC/EC-XIII/3; IOC-XVI/8, Annexes 3, 4, 5 and 9; IOC-TC/OPC-IV/3S; IOC/GE-GLOSS-II/3; IOC/INF-828, -829, -830, -832, -851 and -854).

191 IODE, in implementing its Work Plan for 1990-91, has carried out the following actions relative to the establishment and management of global ocean data sets: started the Global Temperature-Salinity Pilot Project (see section 6.2.1); advanced the detailed plans for an Ocean Climate Data Workshop to be held in the USA in February 1992; held an Expert Consultative Meeting on Software for Use on Personal Computers (Ocean-PC, see section 6.2.2); held consultative meetings with the ICSU Panel on World Data Centres at Den Haag, The Netherlands, and Tianjin, People's Republic of China; worked with the *ad hoc* Group of Experts on the Global Ocean Observing System (GOOS) and with other international bodies dealing with oceanographic data management; started consideration of a Global Pilot Project on Acoustic Doppler Current Profile (ADCP) data. These activities have been in addition to the routine work of IODE Member States in assembling ocean data at national, regional and WDC levels. Dr. Flemming stressed that there had been close co-operation with IGOSS. He also stressed the view that, once data had been acquired and made available for exchange, there were still many functions that needed to be carried out if large data sets were to be utilised effectively by Member States. The products and benefits include:

(i) Monitoring the state of the ocean, detection of regional and temporal changes, and the possible detection of verifiable climate changes in the ocean due to human activities.

(ii) Input of large data sets to diagnostic models that will provide improved descriptions of the state of the ocean, help to improve understanding of storms, weather, fish migration and pollutant transport.

(iii) Development of descriptive data products, gridded and contoured data, and cartographic data.

(iv) Transfer of data operationally to prognostic models generating ocean predictions on basin scale and global scale, and contributing to global climate prediction.

(v) Creation of long time-series and historical archives of quality- controlled data within which past climatic cycles may be detected, and against which models can be tested.

(vi) Provision of the boundary conditions for regional and coastal models.

(vii) Establishment of standardized calibrated coastal data sets.

192 Dr. Flemming pointed out that there are, and will continue to be for some time to come, shortfalls in remote-sensing satellite coverage, ship tracks, moored instrument arrays, data delivery, data quality control, long time-series, and historical data sets, and that there are severe shortages of staff and resources at the national and international levels.

193 Dr. Flemming noted the concern expressed by Member States that marine information management should be discussed by the Assembly. He reported that there had been increased support to ASFA and an important marine information project in the IOCINCWIO region. New members had been recruited for the Group of Experts on Marine Information Management (MIM) which needed to meet as soon as possible.

194 Finally, Dr. Flemming expressed strong concern that the Secretariat support for IODE, and in particular for Marine Information Management, will shortly be reduced by the transfer of an IOC staff member in 1991 to a UNESCO Regional Office, resulting in the abolition of a P-3 post in the IOC Secretariat.

195 **The Assembly confirmed** the importance of the management of large data sets in developing GOOS **and noted** that the data sets needed in a Global Ocean Observing System are greater than the data volumes at present handled by IODE and IGOSS, or those at present required by the major ocean science programmes.

196 **The Assembly approved** the actions of IODE in generating long-term quality-controlled data sets **and particularly stressed** the importance of the Global Temperature-Salinity Pilot Project (GTSPP) and of the Ocean Climate Data Workshop (OCDW).

197 **The Assembly requested** the Secretary to ensure that the Third Session of the IODE Group of Experts on Marine Information Management be held during 1991. **The Assembly noted with concern** the decline in resources and staff available in the Secretariat to support IODE, **and strongly supported** efforts to increase these resources.

198 **The Assembly noted** with appreciation the following offers: USA to host the Ocean Climate Data Workshop; China to host a course on ASFA and a course on Marine Information Management; Colombia to host a training course on oceanographic data management; USSR to host a meeting on GTSPP; and UK to host a meeting of the Group of Experts on Marine Information Management. The Chairman IODE expressed his strong appreciation of these offers from Member States.

6.2.1 Global Temperature-Salinity Pilot Project (GTSPP)

199 The Senior Assistant Secretary, Dr. Iouri Oliounine, informed the Assembly of recent developments in GTSPP which was initiated by IOC and WMO to promote, improve and standardize the temperature/salinity data management mechanisms which presently exist in the IGOSS and IODE Systems. This project is a prototype of an end-to-end data-management system, from data collection to the preparation of products. In particular, he referred to the following milestones that have been passed during the last half of 1990: the operational phase of GTSPP commenced in January 1991; the First Session of the IOC-WMO Steering Group on IGOSS-IODE GTSPP was held in Brest, France from 17-19 September 1990 (among other things, the meeting formulated the project implementation plan); the GTSPP Project Plan and the GTSPP Quality Control Manual have been published by the IOC; a meeting was held in the USA in November 1990 between representatives of GTSPP and the WOCE Upper-Ocean Thermal Project, to define the scientific quality control techniques to be used by the WOCE Centres; and the first GTSPP monthly report was prepared and distributed to the IOC and WMO Member States. Plans exist to finalize the GTSPP brochure during the first half of the year and to hold the next session of the GTSPP Group in the USSR in July 1991.

200 Dr. Oliounine emphasized that GTSPP will soon be ready to serve clients. In general, the first clients will be the WCRP, including WOCE and its Upper-Ocean Thermal Project in particular. Other clients include operational users from the fields of marine forecasting, operations and fishing, as well as science and engineering users.

201 **The Assembly strongly supported** the GTSPP Pilot Project and implementation plans and **expressed its satisfaction** with the considerable progress made by IOC and WMO in implementing this important endeavour. It was the general opinion that GTSPP, when developed, will be a valuable instrument in meeting the objectives of the WCP and GOOS. **It noted** that IGOSS and IODE will also profit from the development of GTSPP. **The Assembly appreciated** actions taken by a few Member States in launching the project and thanked Australia, Canada, France, USSR and USA for their efforts and support. **The Assembly recommended** that additional support be provided to GTSPP **and invited** other Member States to join the Project. In this regard, it welcomed the kind offer of China to provide data for GTSPP.

202 The Delegate of the Soviet Union restated the readiness of his country to host the next session of the Steering Group in Obninsk, USSR, from 15 to 19 July 1991, and to provide support to a few experts to participate in the Session.

203 **The Assembly stressed** the importance of the effort planned in 1991 to collect and include historical data, particularly long time-series, in the GTSPP data bank.

204 **The Assembly expressed its satisfaction** with the good co-operation between IOC and WMO on the development of GTSPP **and welcomed** the readiness of WMO to increase support to the Pilot Project by allocating funds in the programme and budget of the WMO for the eleventh financial period which will be proposed to the 11th World Meteorological Congress in May 1991.

6.2.2 Ocean Personal Computer Project (OCEAN-PC)

205 The Assembly considered the Summary Report of an Expert Consultation on OCEAN-PC, a standard software package for oceanographic data processing and exchange (Paris, 7-9 November 1990; Document IOC/INF-828). Several Delegates stressed the exciting possibilities provided by the proposed OCEAN-PC project to transfer modern technology and methods for data treatment to developing countries. This would facilitate the compilation and the use, both nationally and as a contribution to international programmes, of the increasing amounts of data being collected by these countries. It would also help developing-country scientists access and exploit major global data sets.

206 The Representative of the WMO, noting that his organization had already been involved in the preparatory work on OCEAN-PC, informed the Assembly that the WMO Climate Computer (CLICOM) project, which provides a PC hardware and software system for handling meteorological climate data, has recently been extended to cover WMO Voluntary Observing Ships data.

207 **The Assembly approved** the implementation of the OCEAN-PC project recommended by the Consultation. In the first part, to commence operation in 1991, relevant existing software will be assembled, evaluated and distributed. Planned IODE TEMA activities will provide initial training support.

208 The main part of the OCEAN-PC project will specify and develop a software package that will promote the effective use of ocean data. **The Assembly advised** that, to ensure success for OCEAN-PC, there should be strong interaction with users throughout its development, efforts should be concentrated on functions specific to ocean data, and the project should progress in a series of manageable steps. Particular care should be taken to avoid duplication of existing processing packages, to provide links to data formatted for other systems, and to specify the appropriate level of hardware requirements. The data-management and scientific-analysis functions should be included. The OCEAN-PC system may possibly also be used for analytical and modelling purposes.

209 **The Assembly recommended** that the first step be the definition of detailed user requirements, and that this be followed by a data modelling study of these requirements. Noting that timely

implementation of the OCEAN-PC software will not be possible with existing resources, the Assembly requested the Secretary IOC to seek ways to complete these two studies by early 1992 so that they could then provide the basis for decisions on the technical specifications and preparation of the software.

210 The Assembly noted that high-quality training for OCEAN-PC will be essential, and recommended that it be part of the project implementation.

6.2.3 New Technologies for Data and Information Exchange

211 The Chairman of the Committee for IODE, Dr. Nick Flemming, reviewed the new technologies being exploited by IODE to improve the exchange of oceanographic data and information, and referred to Document IOC/INF-830. National and international computer networks are providing the capability to access data catalogues and library catalogues from remote locations, and to transfer limited quantities of data files. Discussions have been started with WMO on the way in which the GTS will be developed during the coming decade to cover increased requirements for the transmission of ocean data. Ship cruise plan information and National Oceanographic Programme (NOP) information for some countries, and science programmes such as WOCE, are already accessible on the OCEANIC data system, which is operated by the University of Delaware. In accordance with the decision of IODE-XIII (New York, 1990), negotiations are under way to extend the use of OCEAN-PC to include NOP cruise plans from other countries. A limiting factor is the delay in receipt of NOP information from Member States. Electronic mail systems are now extensively used by the IOC Secretariat, marine science programme planning offices, and many institutes and laboratories. These systems are an essential part of rapid planning and decision-making. Additionally, he stressed various important uses of CD-ROM (Compact Disk with a Read-only Memory) for data and text distribution.

212 The Delegate of the USA referred to the CD-ROM of Pacific T-S data produced by the US National Oceanographic Data Centre (NODC) and informed the Assembly that a catalogue listing over 20 marine-related CD-ROM products generated in the USA existed. He stated the intention of his country to issue the complete data bank of the World Data Centre A (WDC-A) in CD-ROM form.

213 The Assembly noted the capacity of CD-ROM to distribute enormous quantities of data and textual information cheaply, and the potential this provides for fulfilling data and information needs in developed and developing Member States.

214 The Assembly urged Member States to pursue the application of this technique to oceanographic data and information analysis and exchange.

215 The Assembly stressed that new technology should be introduced in such a way that it could be transferred to developing countries. In this context, there was particular support for the OCEAN-PC project (see section 6.2.2). Several Delegates stressed the pioneering nature of the GTSPP project, and its importance in defining the methodology that would later be incorporated into GOOS. Other Delegates stressed the importance of managing the large data sets, assimilating data into models, and generating data products and information that could be rapidly distributed to Member States.

6.3 TSUNAMI WARNING SYSTEMS AND RELATED MARINE NATURAL DISASTERS

216 The Senior Assistant Secretary, Dr. Iouri Oliounine, introduced this item and drew the attention of the Assembly to United Nations General Assembly Resolution 44/236 of 22 December 1989 which authorized the Secretary-General of the United Nations to implement an International Decade for Natural Disaster Reduction (IDNDR) Programme for the 1990s. He outlined the rationale for, and the objectives of the decade and emphasized that launching the IDNDR Programme gave a new thrust to the modification and improvement of the International Tsunami Warning System in the Pacific which the IOC has been successfully running since 1965.

217 He then referred to the activities of the IOC related to the reduction of the tsunami hazard in the Pacific and in other areas of the world where devastating tsunamis occur (e.g., the Indian Ocean, the Atlantic and the Mediterranean Sea). Four projects are being specifically developed to meet IDNDR objectives:

(i) the Tsunami Inundation Modelling Exchange Project to develop a methodology for estimating tsunami flooding areas and to transfer this technology to developing countries;

(ii) the Near Real-Time Tsunami Modelling Project to arrange rapid determination of seismic parameters for implementation of an automated predictive evaluation technique;

(iii) the Pacific Rapid-Response System Project to mitigate the hazards created by tsunamis and destructive earthquakes within the region through the real-time telemetry of geophysical data;

(iv) the development programme in the area of public awareness and education on tsunamis, to design a tsunami education programme for students and the general public.

218 The drafts of these projects have been completed and are now under review by the IOC Member States. Detailed discussion of the projects will be held at the Thirteenth Session of the International Co-ordination Group (ICG) for ITSU (Ensenada, Mexico, September 1991).

219 He finally informed the Assembly of the state of the IOC project for the establishment of the Regional Tsunami Warning System in the South-west Pacific which was presented to the UNDP several years ago. Though the project was favourably received by UNDP, there has been no progress in obtaining UNDP funding. Because of this, the ITSU Officers at the last Session (Honolulu, USA, February 1991) had to postpone the implementation of the Recommendation of the Twelfth Session of the International Co-ordination Group for the International Tsunami Warning System in the Pacific (ITSU) (Novosibirsk, USSR, 7-10 August 1989) on the development of a similar project for Central America.

220 The Delegate of the Soviet Union presented information to the Assembly on the development of the Interactive Tsunami Modelling System which was developed in his country. The concept of this system is based on the application of advanced numerical models to the prediction of tsunami parameters and opens up the possibility of calculating tsunami generation, propagation and run-up in near-real time. The system has a strong training component and can easily be used at regional tsunami centres. He then informed the Assembly that his country is ready to provide facilities for annual or biannual training courses to train personnel from tsunami warning centres in numerical techniques for their modelling systems, and in simulation of real warning situations.

221 A number of Delegates gave striking examples of great loss of life and vast destruction of property due to tsunami or storm surges, not only in the Pacific, but also in the Indian Ocean, and stressed the importance of numerical models in the prediction of these events.

222 **The Assembly commended** the work done by the International Co-ordination Group for ITSU and by the IOC Secretariat to meet the objectives of the International Decade for Natural Disaster Reduction, **and agreed** that the IDNDR presents the IOC with a unique opportunity and a challenge to foster its activities in tsunami mitigation and in other fields covered by the IOC mandate, such as storm surges and sea-ice prediction and warning.

223 **The Assembly strongly supported** the case for increased funding of the Tsunami programme and other IDNDR-related activities of the IOC **and, in this regard, instructed** the Secretary IOC to make all necessary effort to ensure that UNESCO funds allocated in the UNESCO Programme and Budget for 1990-1991 and for 1992-1993 for natural hazards be used to implement IOC projects related to the IDNDR programme.

224 **The Assembly expressed concern** over the delay in the establishment of the Regional Tsunami Warning System in the Southwest Pacific **and instructed** the Secretary IOC and the Chairman

of the ICG for ITSU to pursue negotiations with UNDP with a view to obtaining the urgent approval of the project because of its importance to the Member States concerned. The Assembly also invited these Member States to express their support and priority for the project to their respective UNDP Resident Representatives. It was especially emphasized that measures should be taken before disaster occurs rather than after.

225 The Assembly decided to support steps taken by the IOC Secretariat in storm-surge research and forecasting and thanked Canada and Japan for their assistance to the Member States of the Bay of Bengal and southern Asia in storm-surge preparedness. It welcomed the kind offer of China to host a training course on storm-surge prediction. A few Delegates expressed their appreciation of and interest in the Modelling System developed in the Soviet Union and the Assembly recommended that the Thirteenth Session of the International Co-ordination Group for ITSU consider the proposal and include it in its training programme.

226 Recognizing the budgetary constraints facing the IOC, the Assembly noted with appreciation the kind invitation of the WMO Representative to join the efforts of WMO and IOC in storm-surge mitigation and sea-ice studies. The Assembly requested the Secretary to contact WMO and the United Nations Development Programme (UNDP) to investigate the possibilities of launching joint projects in this field.

227 Noting that, in the coming few years, new satellites (TOPEX-POSEIDON, ERS-1) will be launched to monitor the ocean, the Assembly emphasized the fact that more attention should be given to the use of remote-sensing facilities to mitigate natural hazards and that the IOC should participate in these activities as far as possible.

7. TRAINING, EDUCATION AND MUTUAL ASSISTANCE IN THE MARINE SCIENCES

228 The Chairman of the IOC Committee for TEMA, Prof. Ulf Lie, introduced this Agenda Item. He reviewed the results of the Fifth Session of the IOC Committee for TEMA (Paris, 25 February - 1 March 1991), as well as the debate on TEMA at the Twenty-fourth Session of the Executive Council (Paris, 7-8 March 1991), with particular attention to the revised TEMA Strategy and Action Plan for 1991-1995 annexed to the Summary Report of the Fifth Session of TEMA.

229 He noted that the Executive Council had endorsed the Strategy and Action Plan, as revised so as more clearly to include high-level education and training in basic marine sciences as an essential component of the TEMA Programme. Continuity of specialist and regional high-level education and training opportunities and related follow-up activities should be ensured.

230 The Executive Council had recognized the value of Marine Science Country Profiles (MSCPs) in enabling Member States to assess needs in the development of marine science capabilities and had noted that the level of the Commission's resources devoted to assisting in the preparation of MSCPs should be carefully balanced in relation to other TEMA actions.

231 The Executive Council had also expressed its concern for the increasing knowledge and technology gaps between developed and developing Member States, and it had recommended a well balanced approach to programme-oriented and specialized training, and basic marine science education. The Executive Council had suggested that the compilation of existing high-level education, training, mutual assistance and development opportunities, as well as the Marine Science Country Profiles (MSCPs), would create a useful information base for enhancing the role of the IOC as a clearing house for Training, Education and Mutual Assistance in Marine Sciences.

232 The Chairman of the Committee for TEMA finally stressed the fact that the Executive Council had affirmed the high priority of TEMA in the work of the Commission.

233 Many Delegates supported the proposed TEMA Strategy and Action Plan for 1991-1995 and requested that it be regularly revised (preferably every two years).

234 Delegates from developing Member States emphasized the need for their own national cadres of well trained scientists and technicians to strengthen the marine science capabilities of their countries. Training and education activities of the TEMA programme are made more effective by being directly related to the on-going IOC Programmes and to on-the-job training. However, the need for basic marine science education at an advanced level (such as master and doctoral degrees) must also be met. A well-balanced approach is required in the provision of training in specified fields and in basic marine sciences in the implementation of the TEMA Programme.

235 In relation to Marine Science Country Profiles, the Delegate of Colombia informed the Assembly of his country's experience in elaborating a national plan for marine science and technology for the decade 1990-2000, and suggested that this plan could be useful in the preparation of Marine Science Country Profiles.

236 Delegates pointed out that TEMA needs should be identified through regional activities, and that existing expertise and regional facilities should be fully utilized in subsequent implementation of the TEMA Programme: an example is the regional OSNLR cruise in the IOCEA region organized in 1989 using a Nigerian research vessel. The role of the regional subsidiary bodies and the follow-up activities should be identified in a future revision of the Strategy and Action Plan.

237 Delegates stated that there is a need to consider a component of the TEMA Programme to develop material for education, such as marine science education modules, dissemination of marine science knowledge through audio-visual techniques and the use of micro-computers.

238 Delegates noted the importance of continuity in training, particularly by the organization of successive training courses on any given theme, as well as follow-up action to provide new knowledge and techniques to former trainees.

239 The Assembly stressed the need for IOC to reactivate its involvement and co-operation with FAO in the exchange of information, the management of, operation, and assistance in the maintenance of research vessels, and related training activities with the International Centre for Ocean Development (ICOD).

240 Delegates stated that a regular review of the implementation of the TEMA Programme is essential and that the Committee for TEMA should meet regularly; i.e., every 2-3 years.

241 The Delegates of Australia and Canada commented, however, that the nature of TEMA and its requirements for effective implementation and further development were better addressed at the regional level and in the technical bodies of the Commission than in a central committee. They expressed the view that neither the establishment of an Expert Group nor the continuation of the TEMA Committee *per se* were necessarily the best options. Specific action was required to improve the profile and status of TEMA and this could take place at the regional and technical levels in the Commission under the direction of the Governing Bodies.

242 The Delegate of Nigeria thanked the Commission for arranging the provision of a set of tide gauges for sea-level monitoring that his country had received through the Voluntary Co-operation Programme (VCP) scheme, and requested relevant training.

243 The Delegate of Portugal informed the Assembly that a high-level meeting of world leaders, scientific personalities and representatives of donor agencies will be held in Lisbon in September 1991, at the invitation of the President of the Republic of Portugal, Dr. Mario Soares, jointly with Professor Federico Mayor, the Director-General of UNESCO. The main objective of the meeting is to increase awareness of the growing lag between industrialized and developing countries in the marine sciences so as to mobilize support for the international mutual assistance effort required to improve the situation, thus contributing to real partnership in ocean affairs.

244 The Representative of IHO informed the Assembly of bilateral hydrographic projects and of the creation of regional centres for the maintenance of marine scientific equipment and training of nautical cartographers; he invited IOC to co-operate more closely with the IHO in the implementation of relevant parts of the TEMA programme.

245 The Delegates of China and France informed the Assembly that their countries were willing to host specialized training courses. The Delegate of USSR announced that his country will organize a training course on marine geological/geophysical data management at WDC-B in September 1991, under the IODE Programme. The Delegate of Turkey also announced a 4-week training course on marine living resources in October 1991.

246 **The Assembly noted with appreciation** the offers by Member States for training opportunities **and instructed** the Secretary to consider possible assistance for them.

247 A sessional working group was formed to review the Summary Report of the TEMA Committee, particularly the revised TEMA Strategy and Action Plan and the addendum prepared on the basis of debate in the Executive Council. Its results were reported to the Assembly by Dr. Hernán Pérez-Nieto, the newly elected Vice-Chairman of the Committee for TEMA. Taking into account the results of the Twenty-fourth Session of the Executive Council, the opinions expressed at the Assembly and those of the sessional working group, **the Assembly accepted** the Summary Report of the Fifth Session of the Committee for TEMA, with the following comments, which should be distributed with the Report:

(i) Marine Science Country Profiles are useful tools for assessing TEMA needs and for encouraging development of marine science capabilities in IOC Member States. Moreover, the usefulness of MSCPs is recognized by donor agencies, so that the prospects for assistance from such agencies would become more favourable.

(ii) Although the preparation of MSCPs may be time-consuming and relatively expensive, the present level of support, as identified in Annex III of the TEMA-V Report (TEMA Strategy and Action Plan for 1991-1995), was considered appropriate.

(iii) In view of a notable lack of marine scientists in the developing Member States, it is urgently required to provide such scientists with an advanced level of education in the field of marine sciences, as well as to train marine technicians.

248 **The Assembly also recommended** the following corrections:

(1) paragraph 27 (2nd line): replace "conclusion" by "views"
(2) paragraph 28 (lst line): replace "conclusion" by "views"
(3) paragraph 30 (2nd line): "would" (delete)
(4) paragraph 69 (3rd line): add: and regional fisheries management; training is also a major component of ICOD's mandate.
(5) paragraph 70: amended as follows:

IOI is a non-governmental organization; training is a major component of IOI's mandate, it is also active in policy research, publishing and technology transfer. Training concentrates on the Exclusive Economic Zones, high technology and regional co-operation. Co-operation with IOC has been developed over an extensive period; nevertheless, IOI seeks cooperation with IOC on a more effective, better co-ordinated and long-term basis. With the participation of IOI, it is planned to establish a regional centre for marine industrial technology and development, with emphasis on such technology as desalination, aquaculture, marine pollution control, in the Mediterranean and similarly in the IOCARIBE region.

249 The Delegate of Cuba reminded the Assembly of the positive role that had been played by the former Divison of Marine Sciences of UNESCO, and indicated that its activities should be continued and improved upon. Although the Commission, including his own country, had insisted on the need for

better co-ordination and integration of these programmes, this should be through the strengthening of the positive aspects of the work of the former Division which is now a part of the UNESCO Office of the IOC and marine science related issues.

250 The Delegate of Venezuela informed the Assembly that his country had offered to provide a site for the proposed international centre for marine technology in the Caribbean region.

251 The Assembly noted this offer by Venezuela.

252 The Assembly recognized the importance of co-operative activities with other organizations in improving implementation of the training programme and instructed the Secretary to organize, whenever possible, joint training courses. The Assembly decided that more training opportunities directly related to IOC Programmes, as well as in basic marine sciences, should be introduced through the TEMA Programme. It instructed the Secretary to pursue well-balanced training activities as well as to establish, as a supplement thereto, a list of training activities with dates, places and subjects, and to update it regularly, and to revise the Action Plan regularly.

253 The Assembly noted the usefulness of MSCPs and encouraged Member States to prepare them; it requested the Secretary to examine the assistance required for their preparation.

254 The Assembly recognized the increasing role of IOC in the development and implementation of extra-budgetary projects and encouraged the Secretary to further develop this new approach to enlarging the role of the Commission.

255 The Assembly expressed its appreciation to the President of Portugal for having kindly offered, at the 25th General Conference of UNESCO, to host a high-level meeting (Lisbon, September 1991) on TEMA problems.

256 The Assembly adopted Resolutions XVI-12 and 13; it instructed the Secretary to seek the resources to implement the Action Plan.

8. REGIONAL SUBSIDIARY BODIES AND CO-OPERATION

8.1 JOINT CCOP-IOC WORKING GROUP ON POST-IDOE STUDIES OF EAST ASIAN TECTONICS AND RESOURCES (SEATAR) AND JOINT CCOP/SOPAC-IOC WORKING GROUP ON SOUTH PACIFIC TECTONICS AND RESOURCES (STAR)

257 The Assistant Secretary, Dr. Kazuhiro Kitazawa, introduced the item. SEATAR is a joint Working Group with the Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP), and STAR is a joint subsidiary body with the South Pacific Applied Geoscience Commission (SOPAC). The SEATAR Transect Study project has been pursued for nearly fifteen years with the participation of National Geological Surveys in countries in the south-east Asian region; three transect study groups (i.e., those for transects IV, VI and VII) have completed their task and the draft maps are now under review. Three others (i.e., III, V and VIII) are nearing completion. The SEATAR Working Group will prepare a review article on its Transect Study for the 25th Anniversary Volume of the CCOP Technical Publication. It decided that the SEATAR Transect Study should be terminated by December 1991 with the publication of two to four maps. Possible subject areas for a new joint project will be identified at the forthcoming Annual Session of CCOP in November 1991. The STAR Working Group organized a series of Workshops sponsored by SOPAC and IOC: on the Use of Submersibles and Remotely Operated Vehicles (ROVs) (1985); on Coastal Processes (1987); and on Marine Geology/Geophysics and Mineral Resources (1989); and it plans to organize a Workshop on the results of the Ocean Drilling Programme (ODP) cruises in the South Pacific, in conjunction with the Annual Session of SOPAC in October 1991.

258 The Delegate of the USA stated that the decision of the SEATAR Working Group to terminate the Transect Study is reasonable and he hoped the results of the Study will be published as early

as possible. Speaking as the Representative of SOPAC, he announced the planned Workshop on results of ODP cruises and requested IOC to co-sponsor it.

259 **The Assembly noted** with appreciation the progress in the preparation of geological/geophysical transect maps of the south-east Asian region **and instructed** the Secretary to assist in the completion of these maps. **It recognized** the importance of co-operative projects with CCOP and SOPAC **and instructed** the Secretary to study carefully the planning of new joint projects so as to avoid duplication with OSNLR projects in WESTPAC.

260 **The Assembly agreed** to co-sponsor the proposed Workshop on results of ODP cruises.

8.2 IOC REGIONAL COMMITTEE FOR THE SOUTHERN OCEAN (IOCSOC)

261 The Senior Assistant Secretary, Dr. Albert Tolkachev, reported on the IOC activities related to the study of the Southern Ocean since the Committee's Fifth Session (Paris, June 1987).

262 The Report and Recommendations of SOC-V were considered by the IOC Executive Council at its Twenty-first Session in March 1988.

263 The Committee, at its Fifth Session, recommended the initiation of three marine biology projects, on the basis of recommendations of the Scientific Seminar on Antarctic Ocean Variability and Its Influence on Marine Living Resources, particularly Krill, organized jointly by IOC and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) with the support of SCOR and the Scientific Committee on Antarctic Research (SCAR), prior to SOC-V. The Executive Council had noted that these proposed research activities would be considered by SCAR, SCOR and other organizations on a larger scale and had therefore suggested postponing action on the proposed projects.

264 During this period, consultations were held with SCAR, SCOR and CCAMLR on the initiation of the activities proposed by SOC-V, as well as on the current concern for environmental conditions in the Antarctic and Southern Ocean in relation to potential climate and global change.

265 Matters relevant to the Antarctic environment were given particular attention at the 15th Consultative Meeting of the Antarctic Treaty System (Paris, 9-19 October 1989), at which IOC was represented and to which a report on IOC activities in the Southern Ocean was submitted by the IOC Secretariat.

266 **The Assembly noted** with interest that the Antarctic Science Conference, to be held in Bremen, Germany, 23-27 September 1991, under the sponsorship of SCAR and with the co-sponsorship of IOC, will address a number of issues related to the Antarctic and Southern Ocean environment, including sea-level changes, fishery resources, global climate models and the Southern Ocean and greenhouse effects. **The Assembly agreed** that the discussion of these issues will be of great importance for the creation of a sound basis for future international research initiatives in the Southern Ocean.

267 The Chairman of the CCAMLR Scientific Committee, Dr. Ole Østvedt, informed the participants of the decision of CCAMLR to initiate an ecosystem monitoring programme that will include monitoring of the living resources and the marine environment of the Southern Ocean. **The Assembly agreed** that the IOC should co-operate with CCAMLR in this programme in view of the recommendations of SOC-V and of IOC activities under OSLR and IOC's ocean services.

268 **The Assembly noted** with satisfaction that recommendations of the Fifth Session of the Regional Committee for the Southern Ocean on marine research and ocean services were being implemented in co-operation with other international organizations within the framework of other programmes. These include: (i) implementation of WOCE and, in particular, WOCE Core 2 Project "Southern Ocean", in co-operation with SCOR and WMO; (ii) Open-Ocean Baseline Study, under GIPME in co-operation with SCOR and SCAR; (iii) development of a network of IGOSS Ship-of-Opportunity Lines in the Southern Ocean within the framework of the IOC-WMO IGOSS Programme; (iv) development of sea-level

network in the Southern Ocean within the framework of GLOSS; (v) development and improvement of oceanographic data and information related to the Southern Ocean through the IOC Committee on IODE.

269 The Assembly expressed its appreciation to Argentina for its support of the Responsible National Oceanographic Data Centre (RNODC) for the Specialized Oceanographic Centre (SOC) established in the NODC of Argentina in 1987, and to Australia for its support of the IGOSS Specialized Oceanographic Centre for the Indian and South Pacific Oceans. The Assembly welcomed the initiative of the Group of Experts on GLOSS to initiate the IGOSS Sea-Level Pilot Project in the Southern Ocean and the offer of Australia to seek to provide the necessary support for the IGOSS Specialized Oceanographic Centre for this Project. It was also noted that the proposal of SOC-V on the preparation of a bathymetric chart of the Southern Ocean, as recommended by the Executive Council at its Twenty-first Session, had been addressed to the Chairman of the IOC Consultative Group on Ocean Mapping.

270 The Delegates of Argentina, China, Japan and Spain reported on national programmes and plans relating to the study of the Southern Ocean.

271 The Delegate of Canada suggested that IOC should establish contact with the Arctic Ocean Sciences Board in view of its work on the marine environment of polar regions.

272 The Assembly agreed that the major efforts of IOC in the Southern Ocean should continue to be concentrated on the expansion and improvement of ocean observations and data and information management within the framework of IGOSS, GLOSS, DBCP and IODE and on the strengthening and support of the Southern Ocean components of the WOCE, JGOFS, OSLR and GIPME programmes in co-operation with SCAR, SCOR, CCAMLR and WMO.

273 Regarding the activities of SCAR on oceanographic data management in support of the planned Antarctic component of the IGBP, the Assembly requested the Chairman of the IOC Committee on IODE to contact the Executive Secretary of SCAR so as to ensure proper co-ordination of oceanographic data management between the IOC Committee on IODE and SCAR and to avoid duplication of national and international efforts in this field.

274 The Assembly requested the Secretary to pursue the co-operation with the relevant bodies working in the Southern Ocean and to maintain a dialogue in this context with the SCAR and CCAMLR Secretariats, so as to help ensure co-ordination of activities.

8.3 MATTERS ARISING IN OTHER REGIONAL SUBSIDIARY BODIES

8.3.1 IOCARIBE

275 The Chairman of the Sub-Commission, Prof. Hernán Pérez-Nieto, and the Secretary of IOCARIBE, Dr. Fernando Robles, introduced this Agenda Item, referring particularly to the recent Meeting of IOCARIBE Officers held in the IOCARIBE Secretariat, Cartagena, Colombia, 18-20 February 1991. The draft Executive Summary of the meeting was distributed during the Assembly; the final version will be distributed by the IOCARIBE Secretariat.

276 The programmes and services of the Sub-Commission are actively passing from the planning stage (re. IOCARIBE Medium Term Plan (1990-1995) approved by the Twenty-third Session of the Executive Council) to the operational phase. This applies to: Physical Oceanography and Climate, with support received or foreseen from NOAA, NASA, ESA and UNEP; the IOC-UNEP Regional Project on Marine Pollution Monitoring, Research, Control and Abatement in the Wider Caribbean (CEP POL) jointly implemented with UNEP and with support from SIDA/SAREC of Sweden; a regional component of OSNLR with support from ICOD, Canada, the European Economic Community (EEC), and, in the near future, France; a regional component of OSLR with potential support from the EEC for the SOAR sub-project; regional GLOSS and MIM projects with support from NOAA; and re-activation of a regional component of IODE through the organization of a Training Course on Microcomputers and Data Management for Operators of NODCs, in Bogota, Colombia, October 1991. Regarding longer-term aspects, the Officers Meeting recommended a special TEMA/IOCARIBE effort in physical, chemical and

geological oceanography. All activities referred to, and other general considerations, are listed in the Draft IOCARIBE Action Plan annexed to the Report of the Officers Meeting.

277 The Assembly expressed its satisfaction with and endorsed the report on the activities of the Sub-Commission.

278 Several Member States emphasized the example provided by IOC/IOCARIBE and UNEP in developing jointly implemented programmes, such as CEP POL with UNEP, and by IOCARIBE in regional components of IOC programmes, such as GLOSS.

279 The Delegate of the USA reported on a US Expert Meeting on the Wider Caribbean Sea attended by sixty US scientists (Miami, USA, 17-19 December 1990), at which great attention was paid to the IOCARIBE Medium-Term Plan, and recommendations made, among others, on co-operative research and training through an extension of the US International Sea Grant Programme for the Caribbean region as well as on support for regional marine information management systems. The report of the meeting will be published in the near future by the US National Academy of Sciences.

280 The Delegate of Venezuela informed the Assembly of the launching of its new research vessel in March 1991, and confirmed the possibility that it be used in the leg crossing the Cariaco Trench, to the Isla de Aves and Puerto Rico, contemplated in the Physical Oceanography and Climate Programme of IOCARIBE. He also stressed the need to define as soon as possible the functions of Officers of the Commission's regional subsidiary bodies.

281 The Delegate of France confirmed his country's secondment of an Associate Expert to the IOCARIBE Secretariat in the very near future, to cover regional components of OSNLR.

282 The Assembly acknowledged with thanks the support provided by Member States and Agencies to IOCARIBE activities, in particular by Canada, Colombia, Costa Rica, Cuba, France, Mexico, Sweden, USA, Venezuela, and the European Economic Community.

8.3.2 WESTPAC

283 This Agenda Item was introduced by the interim Chairman of the IOC Sub-Commission for WESTPAC, Prof. Su Jilan. He paid tribute to the former Chairman of the Sub-Commission, Prof. Takahisa Nemoto, who had passed away in August 1990.

284 He informed the Assembly that the establishment of the IOC regional Secretariat for WESTPAC in Bangkok, Thailand, is underway. Following the very generous offer of the Government of Thailand to host the permanent IOC secretariat for the Sub-Commission, action is in hand to conclude the necessary formal agreements. He also informed the Assembly that an interim office has been established at Chulalongkorn University, Bangkok, with an IOC consultant attending to the establishment of the regional Secretariat.

285 Prof. Su informed the Assembly that the Government of Malaysia has kindly offered to host the IOC WESTPAC Scientific Symposium entitled "Marine Science and Management of Marine Areas of the Western Pacific". He encouraged Delegates to sponsor their scientists to participate in the Symposium, which will be held in Penang, Malaysia, 2-6 December 1991.

286 The Assembly expressed its appreciation to the Government of Japan for the late Professor Nemoto's contribution to WESTPAC and conveyed its condolences to his family on his untimely death.

287 The Delegate of Malaysia informed the Assembly that, in addition to hosting the IOC WESTPAC Scientific Symposium, his country will host the Advanced Training Course on Near-Shore Sedimentation and the Evolution of Coastal Environment, sponsored by IOC and Germany, and an IOC Workshop on River Input of Nutrients to the Marine Environment in WESTPAC.

288 The Delegate of the United States indicated that the high priority his country assigns to WESTPAC is reflected in the US financial support for a professional staff member in the IOC regional Secretariat for WESTPAC. The USA will also provide $10 000 for young scientists to attend the WESTPAC Scientific Symposium.

289 The Delegate of Australia reaffirmed his country's support for the Sub-Commission's programmes and informed the Assembly that Australia would provide US$ 15 000 per year to the IOC Trust Fund for the 1991-1992 biennium and would also seek to provide direct financial support to the IOC WESTPAC Scientific Symposium.

290 The Delegates of China, France and Japan confirmed their intention to second Associate Experts to the IOC regional Secretariat for WESTPAC once it had been established.

291 The Delegate of France informed the Assembly that her government will provide FF.50,000 to support the participation of young scientists in the IOC WESTPAC Scientific Symposium.

292 The Delegate of Japan expressed his country's willingness to continue the annual Training Course on Data Management hosted by Japan, as well as ship-board training.

293 The Assembly thanked the Government of China for hosting the First Session of the IOC Sub-Commission for Western Pacific.

294 The Assembly noted with appreciation the kind offer of the Government of Thailand to provide facilities for the IOC regional Secretariat for WESTPAC and for the interim office for WESTPAC; it also noted that progress has been achieved in establishing the IOC regional Secretariat for WESTPAC. The Assembly instructed the Secretary IOC to accelerate, in consultation with relevant Thai authorities, the establishment of the Secretariat so that it could begin operation as soon as possible.

295 The Assembly urged Member States to promote participation of their scientists and provide financial support to the IOC WESTPAC Symposium on Marine Science and Management of Marine Areas of the Western Pacific.

8.3.3 IOCINCWIO

296 The Chairman of IOCINDIO, Dr. Salahuddin Quraishee, on behalf of the Chairman of IOCINCWIO, informed the Assembly of the on-going and planned activities in the region. He mentioned particularly the co-operation established with the Swedish Agency for Research Co-operation with Developing Countries (SAREC) in the field of research, observations, training and assistance in marine coastal management. Programmatic activities were initiated in 1990 with the convening of a workshop on regional aspects of marine pollution, in Mauritius, which at the same time initiated action in one of the programme components of the East African Action Plan of UNEP. For 1991, it is planned to hold a regional workshop on sea-level measurements and the impacts of potential sea-level rise, and a regional training course on remote-sensing techniques and applications to coastal-zone management. Dr. Quraishee referred also to the activities of the RECOSCIX-WIO regional marine information network, which had received substantial support and would serve as a model for other regional projects of a similar nature.

297 In response to a request from the US Delegation, the Chairman of the Committee for GIPME, Dr. Neil Andersen, provided further details on the state of the JGOFS Indian Ocean Study. Dr. Andersen recalled that, in his introduction to Agenda Item 5.5, he had made reference to specific actions IOC was beginning to develop to assist SCOR in the implementation of this JGOFS Study. He stressed the fact that it was in the very early stages of planning, the first meeting having been convened only two months ago in Goa. However, he pointed out that, if the JGOFS North Atlantic Pilot Project conducted in 1989 and the Equatorial Pacific Process Study scheduled for 1992, could serve as examples, the Indian Ocean Process Study would undoubtedly be a multi-vessel, multidisciplinary, co-ordinated international effort. Therefore, besides the direct participation of scientists from the region and the provision of hands-on training in JGOFS measurements, the study could possibly provide opportunities for advanced students to conduct research on a specific problem which could help them meet thesis requirements for advanced

degrees. However, he emphasized the absolute necessity of developing ties now at the early stages of planning to realize this end.

298 The Assembly took note of the information provided and expressed its great appreciation to SAREC for the support given to the IOC.

8.3.4 IOCINDIO

299 This Agenda Item was introduced by the Chairman of the IOC Regional Committee for the Central Indian Ocean, Dr. Salahuddin Quraishee (Pakistan). He noted that IOCINDIO was a relatively new IOC subsidiary body, having been founded in 1988. He noted that certain priority projects were identified during the First Session of the Group (Islamabad, July 1988). These included coastal dynamics, living resources and harmful algal blooms, a geological survey of the Indus Cone, marine pollution activities, sea-level observations, and regional storm-surge prediction. Progress made by regional Member States in these various areas was described, and includes: training courses, cruises undertaken by countries in the region or aboard vessels from outside the region, and fishery research. Dr. Quraishee noted that the OSLR workshop, to be hosted by Oman in 1991, will be of great value in enhancing the efforts applied to living-resource investigations. He also noted that two Scientific Steering Groups (for OSLR and OSNLR) were in formation and would be meeting in the near future to discuss these programmes, and that a marine pollution workshop is scheduled for Goa, India, in 1991. The Chairman of IOCINDIO also thanked the Canadian Government for its offer of deep-sea tide gauges to assist in the prediction of storm surges.

300 Dr. Quraishee indicated that the lack of a strong communication network in the region placed Member States at a distinct disadvantage when trying to co-ordinate their efforts and asked the assistance of the IOC Secretariat to help solve this problem. He then described oceanographic activities that had taken place in the region during the intersessional period. He mentioned a training course for African countries held in Pakistan, and reports on coastal-zone management activities for Bangladesh, Sri Lanka and Pakistan.

301 Dr. Quraishee concluded by listing the areas in which various Regional States had an interest; these included: fishery research; the development of institutional infrastructures; tropical-cyclone and storm- surge prediction; exploitation and management of offshore mineral resources; coastal pollution; and petroleum exploration, exploitation, management and pollution mitigation. He urged the IOC Secretariat, other UN Agencies and interested donor countries to assist the region to ensure the success of these programmes.

302 Several Delegates commented on the statement of the IOCINDIO Chairman. In brief these were as follows: The Delegate of Germany restated his country's wish to see the creation of a single Sub-Commission for the entire Indian Ocean area. The Delegate of Sri Lanka described the activities of Indian Ocean Marine Affairs Co-operation (IOMAC) and encouraged co-operation between IOCINDIO and IOMAC. The Delegate of India emphasized the need for the nine original priority projects adopted by IOCINDIO during its First Session to receive more support in order to ensure the viability and success of these efforts. The Delegate of Denmark reported to the Assembly on his country's contributions to the Region which included underway training and exchange of scientists and equipment. He also mentioned co-operation with Thailand and India and in JGOFS and an upcoming Andaman Sea trench study. The Delegate of the Islamic Republic of Iran noted the destruction of the Persian Gulf marine information and research infrastructure and the need to rebuild these facilities. The Delegate of The Netherlands supported the idea of a single Sub-Commission for the Indian Ocean, for logistic and scientific reasons. As Dr. Quraishee mentioned in his introduction, The Netherlands will carry out an Indian Ocean Programme in 1992 in co-operation with Member States of IOCINCWIO and IOCINDIO.

303 Dr. Quraishee then commented on the four areas of importance which he noted from the discussion: (i) TEMA is the most important programme in the region and he reaffirmed the region's interest in increased support from the IOC Secretariat and interested donor countries; (ii) there is certainly a need for increased co-operation between IOCINDIO and IOCINCWIO but, at this juncture, the formation of a single Sub-Commission for the Indian Ocean is premature; (iii) broad support for the JGOFS Indian

Ocean Investigation is important; (iv) there is a need for co-operation between IOC, ROPME, and UNEP to help rebuild the facilities in the ROPME sea area which had been devastated by recent armed conflicts.

304 The Assembly considered it premature to create an IOC Sub-Commission for the Indian Ocean at this stage, but invited the Regional Committee Chairmen concerned and the Secretary IOC to consider the possibility of arranging the forthcoming sessions of IOCINDIO and IOCINCWIO so that the two Committees could meet together for part (1-2 days) of their Sessions.

8.3.5 IOCEA

305 The Chairman of the Regional Committee for the Central Eastern Atlantic (IOCEA), Dr. Sekou Konate, informed the Assembly of the development of the activities envisaged in the Work Plan for 1990-1991 established at IOCEA-II which he had presented at the Twenty-third session of the Executive Council.

306 Dr. Konate stressed the need to accomplish the planned activities for 1991, in particular the launching of the OSLR regional component and the organization of a mission to examine the possibility of developing a regional information network and the strengthening of the capabilities of the regional physical oceanographic data centre established in Conakry (Guinea). These two activities should be considered in the context of the decision of the Ministerial Conference of the African States of the Atlantic coast to create a regional data centre on marine living resources to be based in Rabat (Morocco). Dr. Konate informed the Assembly that a project on coastal erosion was presented to the African, Caribbean and Pacific Group of States (ACP) for possible funding and a request for support to this project was also addressed to UNESCO under its Programme 'Priority Africa'.

307 The Delegate of Senegal confirmed the offer of his country to host the Third Session of the Regional Committee in 1993.

308 The Delegate of Portugal expressed the interest of his country in the regional activities, particularly those related to OSLR, GLOSS and IBCEA.

309 The Delegate of the Ukrainian SSR informed the Assembly that his country is ready to provide expertise in the development of oyster culture, and to support the regional physical oceanographic data centre, with a view to integrating it into the IODE system. The Ukraine also offers the possibility of joint oceanographic expeditions on board the Ukranian research vessel located in Conakry.

310 Mr. John Kaboré, of UNESCO, presented the UNESCO programme "Priority Africa" for Education, Culture and Environment, and the Assembly expressed its appreciation for the information provided.

311 The Assembly took note of the developments and emphasized that the implementation rate should be maintained to the extent possible, and that further extra-budgetary means should be identified for the region.

8.3.6 Collaboration with ROPME

312 Dr. Selim Morcos (IOC Secretariat), as rapporteur of the sessional working group, which the Assembly established for this topic, presented a summary of the deliberations and views expressed by this Group, which was chaired by Dr. Ole Østvedt. He added that this Agenda Item was introduced upon the initiative and proposal of the Islamic Republic of Iran and as a result of the unanimous concern of many Delegations over the recent reports on the massive oil spill in the ROPME Sea Area, and the burning oil wells in Kuwait.

313 ROPME is the Regional Organization for the Protection of the Marine Environment whose members are: Bahrain, Iraq, Islamic Republic of Iran, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. IOC and UNESCO have had continuing relationships with ROPME since the late seventies

during the preparatory stage that led to the adoption of the Kuwait Regional Convention for Co-operation on the Protection of the Marine Environment from Pollution, referred to as the Kuwait Action Plan, which entered into force on 30 June 1979.

314 As soon as the news of the oil spill became known, the Secretary IOC took the initiative to contact a number of marine scientists with recognized experience in monitoring oil spills, assessment of their fate and their ecological effects. The main objective was to mobilize an international interdisciplinary team of experts who will be ready to render assistance at short notice. Furthermore, a strategy was elaborated on how to address the problem with a view to offering advice on appropriate action and possible remedial measures. The basic approach involves an intensive and extensive short-term programme, and a more limited-scale long-term programme.

315 In addition, IOC and UNESCO are organizing this month a training course in Doha (Qatar) on the response of marine organisms to oil spills and their rehabilitation afterwards.

316 At the same time, the IOC Secretariat was in continuing contact with UNEP on the collective and co-ordinated efforts of the UN system. The IOC participated in the Interagency Consultations that took place in Geneva, 5-6 February 1991, and on 15 March 1991, to develop an Interagency Environmental Action Plan. This Action Plan has a global approach and has three main components: (i) atmospheric; (ii) terrestrial; and (iii) marine and coastal environment. IOC is expected to contribute to the following elements of the Action Plan: (i) air/sea interaction; (ii) oil pollution assessment and monitoring; (iii) oceanographic data support; (iv) ecosystems; and (v) impact on living marine resources.

317 Delegates informed the sessional working group that some research vessels and laboratories had been destroyed, and there is a need to assess the present national capabilities in the region in terms of scientific personnel, laboratories, equipment and research vessels.

318 Delegates from the region suggested that short-term assistance by IOC is required in the form of: (i) experts; (ii) training; and (iii) re-establishing the marine research infrastructure (laboratories and vessels) in the region.

319 The long-term effort of IOC should be directed towards the organization of oceanographic cruises to examine the oceanographic conditions related to oil pollution. This is the area where the region is in great need of more assistance and expertise.

320 It was suggested that an *ad hoc* working group on oceanographic co-operation within the ROPME Sea Area be established and start its work as early as possible, to advise and to facilitate IOC efforts in the region.

321 Furthermore, it was proposed that IOC should convene, with the technical support of GIPME, an international scientific conference on the oceanography and marine ecology of the region in relation to the flux, fate and effects of pollutants, in co-operation with the Member States of the region.

322 The Delegate of Kuwait described the serious environmental damage caused by oil spills in Kuwaiti and adjacent waters. He emphasized the potential threat to the region as well as the serious damage caused to the oceanographic research infrastructure in Kuwait and requested IOC and its Member States to provide assistance in rebuilding the oceanographic research infrastructure and in conducting oceanographic cruises for the assessment of the fate, fluxes and effects of the pollutants. The statement of the Delegate of Kuwait has, at his request, been attached to the present Report as Annex VI.

323 The Delegate of the Islamic Republic of Iran expressed his thanks to the Chairman, Secretary and Member States of IOC for their support of the proposal concerning the pollution in the Persian Gulf; he proposed the establishment of an *ad hoc* working group to deal with this problem and promised to give strong support to its activities. He strongly recommended the idea of organizing an international conference, and expressed his pleasure to invite IOC to hold this conference in Iran.

324 Delegates expressed their concern and support to the Member States of the region and to the proposed efforts of IOC.

325 **The Assembly expressed** its deep concern and sadness over the environmental damage resulting from the massive oil spill and the burning oil wells in Kuwait **and decided** to focus its attention on the grave consequences and adverse impact on the marine and coastal environments in the region.

326 **The Assembly emphasized** the urgent need for IOC to carry out, within its terms of reference and fields of competence, an oceanographic research and monitoring programme consistent with the Interagency Action Plan, and in concert with other national and international organizations, including those of the UN System.

327 **The Assembly noted** with appreciation the expressions of solidarity and partnership by the Member States who had declared their willingness to contribute and extend their help to support IOC efforts to reduce and limit the environmental damage to the coastal and marine environments.

328 **The Assembly stressed** the need to mobilize resources required to re-establish the infrastructure for scientific research and services and particularly the oceanographic laboratories, research vessels, libraries and data centres.

329 **The Assembly expressed** unanimous support for an IOC effort to play an active role in providing training and mutual assistance under TEMA and IOC-VCP.

330 **The Assembly noted** that a circular letter from the Secretary IOC to Member States on this issue was already available to Delegates **and therefore urged** them to initiate action immediately on their return to their respective countries.

331 **The Assembly adopted** Resolution XVI-14.

8.3.7 Other Regions

South-east Pacific

332 The IOC Senior Assistant Secretary, Dr. Fernando Robles, introduced this Agenda Item, referring to the increased number of activities developed in co-operation with the "Comisión Permanente del Pacífico Sur" (CPPS). This involves in particular: the "Estudio Regional del Fenómeno El Niño" (ERFEN) of the CPPS and the related UNDP-IOC-CPPS El Niño Project; the joint CPPS-IOC regional component of OSNLR; and the support provided by IOC to the South-east Pacific Regional Seas Action Plan implemented by the CPPS and UNEP. He noted that the eastern Pacific TOGA sampling network is critical for the real-time exchange of information through ERFEN via electronic mail. He announced that the second co-ordination meeting for the UNDP-IOC-CPPS El Niño Project will be held in conjunction with the Seventh Session of the Joint IOC-WMO-CPPS Working Group on the El Niño Investigations, in Cartagena, Colombia, 2-7 December 1991, following the kind invitation of Colombia. An important long-term TEMA initiative in the region is the project under negotiation with the European Economic Community and bilateral sources to establish, at the University of Chile, a high-level regional educational and research centre for oceanic and atmospheric sciences. He concluded that the present activity level of collaborative programmes and services between IOC and CPPS deserves the secondment of an IOC Associate Expert to the CPPS Secretariat.

333 **The Assembly expressed** great satisfaction with the continuing and increased level of collaboration between IOC and CPPS in programmes of common interest in the South-east Pacific region **and instructed** the Secretary IOC to explore with Member States of the Commission, the possibility of obtaining the secondment of an IOC Associate Expert to the CPPS Secretariat.

334 The CPPS Member States re-stated the importance of the NOAA/USA support to the eastern Pacific components of TOGA and urged the USA to maintain the on-going sampling network currently being supported by the south-east Pacific countries.

South-west Atlantic

335 The IOC Senior Assistant Secretary, Dr. Fernando Robles, presented on-going and potential activities in the south-west Atlantic, particularly in the fields of Marine Pollution Research and Monitoring, OSNLR, OSLR and in support of WOCE.

336 The Assembly commented with satisfaction on the work done by the Commission in the south-west Atlantic, through the IOC Associate Expert seconded by Sweden to the UNESCO Regional Office for Science and Technology (ROSTLAC), in Montevideo, Uruguay, and expressed its appreciation to, and thanked, Sweden for considering the continuity of this secondment, through IOC.

337 Brazil, Argentina and Uruguay expressed their intention to study, at an appropriate time, the development of an IOC regional co-ordination mechanism, taking into account the existing co-ordination between the countries of this region, noting that, if these countries so decide, in due course, they will request the Secretary IOC to provide the necessary assistance.

8.4 MEDITERRANEAN

338 The IOC Assistant Secretary, Mr. Gualter Soares, introduced this item. He informed the Assembly of three significant events that had marked the evolution of the activities supported by IOC and developed in co-operation with ICSEM. The first two events concern the programme in physical oceanography: Physical Oceanography of the Eastern Mediterranean (POEM) and the International Research Programme in the Western Mediterranean (PRIMO). The third, concerns the development of an OSNLR regional component.

339 With regard to POEM, the Fourth POEM Workshop (Venice, Italy, 27 August to 1 September 1990), preceded by a preparatory meeting organized in Lerici, Italy, 11-13 June, laid the basis for a new phase, POEM II, starting in 1991, which includes interdisciplinary studies. Based on the discussions made during the meeting held in Lerici, four working groups have analysed the following subjects: air-sea interaction, deep-water formation, biology-chemistry, and logistics.

340 During 1991, it is foreseen that an Intercalibration Workshop will be held in Split, Yugoslavia, to create a common approach to the basin-wide surveys starting in autumn this year. A Workshop especially devoted to questions related to air-sea interaction is scheduled for early 1992.

341 Regarding PRIMO, a joint IOC-ICSEM *ad hoc* Group of Experts was constituted. This Group prepared an Action Plan (Document IOC/INF-853) which was presented at a special session during the Thirty-second ICSEM Congress (Perpignan, France, October 1990). A first operation, PRIMO-O, began in autumn 1990 in the northern sector of the western basin, involving scientific teams from France, Germany, Italy, Monaco and Spain.

342 The third event is the formation of a Joint IOC-ICSEM Regional Group for OSNLR which prepared an Action Plan for the development of research and impact related coastal zone studies under the general theme of coastal sedimentary dynamics.

343 A first project focussing on the insular coastal systems (with Malta and Cyprus as case studies) was presented to the Commission of the European Communities (CEC) for possible support.

344 The Secretariat has established contact with the Marine Science and Technology Programme (MAST) of the CEC, in particular, within the framework of the proposed Mediterranean Integrated Project of MAST, so as to ensure co-ordination and, if possible, to obtain support for the activities in the Mediterranean.

345 The Delegate of Algeria informed the Assembly that his country offers to host a planned OSLR Workshop scheduled for 1992.

346 **The Assembly stressed** that interaction and co-operation between the different programmes supported by IOC should be encouraged. **The Assembly recognized** that these studies can contribute significantly to the advance of ocean science in general. The Mediterranean should be considered as a model ocean and a test basin. **The Assembly instructed** the Secretary to continue and further develop co-operation with European programmes through partnership and possible support from the CEC. **The Assembly decided** that the level of resources to be allocated should be adequate for satisfactory programme implementation.

9. CO-OPERATION WITH OTHER ORGANIZATIONS OF THE UNITED NATIONS SYSTEM AND OTHER BODIES

9.1 THE INTER-SECRETARIAT COMMITTEE ON SCIENTIFIC PROGRAMMES RELATING TO OCEANOGRAPHY (ICSPRO)

9.1.1 Twenty-eighth Session of ICSPRO

347 The Chairman introduced this Agenda Item, referring to Documents ICSPRO-XXVIII/3 and IOC-XVI/8, section 9.1.1.

348 He noted that the session had included considerable discussion on joint planning and harmonization of work. The Committee had agreed, at the suggestion of UNEP, that the IOC be used as a joint specialized mechanism for co-ordinating the technical aspects of the potential UNEP Regional Seas Action Plan for the Black Sea, which the UNEP Governing Council had agreed to initiate.

349 The Committee had prepared a preliminary draft of a joint statement as a basis for a possible joint contribution to the work of the UNCED Preparatory Committee. The consolidated draft had later been submitted to the Preparatory Committee, and is reproduced as Annex III of Document ICSPRO-XXVIII/3. The Secretary IOC had presented a paper on the development of the global ocean-observing system, including the coastal zone, and the role of the ocean in global climate change.

350 ICSPRO had agreed:

(i) to help jointly ensure that appropriate documentation be made available to delegations of governing bodies of various agencies and programmes and to help ensure that policy statements made in different fora were consistent;

(ii) that all ICSPRO agencies take every opportunity to raise awareness of the role of the oceans in climate change; and

(iii) that collective efforts be continued by the ICSPRO Members and co-operating bodies to further the development of an ocean-observing system including the coastal zone, *inter alia*, tied to the problems of global and regional climate changes and their impacts.

351 The Committee had reviewed recent developments and reports to the UN General Assembly on marine-related topics in the context of implications of the new ocean regime under the UN Convention on the Law of the Sea (UNCLOS).

352 The Chairman finally noted that ICSPRO's consideration of the legal aspects of ocean data acquisition systems, aids and devices (ODAS) would be discussed under Agenda Item 9.1.2.

353 **The Assembly noted with appreciation** that the ICSPRO is paying increased attention to planning, harmonization and preparation of joint inter-agency actions. **The Assembly emphasized** the

importance of this development and of the use of the IOC as a joint specialized mechanism for the agencies concerned. **The Assembly considered** that it may be appropriate at a convenient moment, for the Chairman and the Director-General of UNESCO, in consultation with the Secretary, to discuss with Executive Heads of the Member Organizations of ICSPRO their support to the IOC Secretariat, with reference to the excellent example provided by WMO.

354 **The Assembly confirmed** that further action should be taken by the Secretary to update the Long-term and Expanded Programme of Oceanic Exploration and Research (LEPOR), taking into account relevant reports to the UN General Assembly on marine-related topics, contributions to the preparations for UNCED 1992 and elements of the IOC Strategy for the Future (Document IOC/FURES-III/3, Annex IV), as well as the joint strategy document being prepared by UNEP and IOC, the first draft of which is provided in Document IOC/INF-841 prov.

355 **The Assembly decided** that IOC should emphasize its willingness to assist Member States through ICSPRO in the assessment of resources on the continental shelf, as appropriate, within the context of the United Nations Convention on the Law of the Sea, and possibly using the joint IOC-FAO Programme of Ocean Science in Relation to Living Resources and the joint IOC-UN(OALOS) Programme of Ocean Science in Relation to Non-Living Resources, **and instructed** the Secretary to bring this to the attention of ICSPRO at its next session.

356 **The Assembly noted** that matters relevant to the UN Conference on Environment and Development, Brazil 1992, and the development of the global and coastal ocean-observing system, at the present time, are priorities for the Secretary as regards ICSPRO.

9.1.2 Study of Legal Aspects of Ocean Data Acquisition Systems (ODAS)

357 This Agenda Item was introduced by Prof. Anatoli Kolodkin, of the Soviet Maritime Law Association (SMLA); he briefly reviewed the work undertaken so far to study the legal aspects of ODAS. The SMLA draft contains three main parts: a preamble, international legal provisions, and civil legal aspects. Prof. Kolodkin also suggested some further steps to be taken to speed up the preparation of a draft convention.

358 **The Assembly was particularly pleased** to note that Prof. Kolodkin and his team had prepared a draft of a possible convention on the legal status of ODAS, on the basis of all available legal instruments and of various documents, comments, etc., made since the early 1970s.

359 **The Assembly agreed** that the preparation of such a draft convention was an important undertaking, although Delegations showed slightly different standpoints with regard to the urgency of the exercise.

360 **It underlined** its view that IMO should collaborate with IOC in reviewing the preliminary draft instrument prepared by IOC. The possibility of concluding bilateral arrangements, at least as an interim measure pending the adoption of a convention, was raised, but it was stressed that bilateral arrangements could not cope with the fact that freely drifting objects might enter unexpectly areas under different legal regimes. In this respect, the Assembly's attention was drawn to the problems relating to data acquisition and use in waters under national jurisdiction (in the sense of UNCLOS provisions) and to the control that coastal States might wish to exercise over the use of such data.

361 **The Assembly considered** that questions relating to non-drifting ODAS are taken care of through various existing legal instruments.

362 **It further considered** that drifting platforms are of the utmost interest to IOC in developing the global ocean observing system, and that problems relating to the deployment of such devices should be resolved as far as possible to the satisfaction of the various parties concerned. Preparation of a draft convention on the legal status of ODAS, as described at its previous session (see Summary Report of IOC-XV, Document SC/MD/91, para. 253) should be improved. To this end, the Assembly **agreed** on the following actions:

(i) Member States would be invited to provide the Secretary IOC, preferably after a national review and before the Twenty-fifth Session of the Executive Council, with comments on the draft prepared by the SMLA (Document ICSPRO-XXVIII/3, Annex IV);

(ii) on the basis of comments received from countries and those of ICSPRO (made at its Twenty-eighth Session), Prof. Kolodkin and his team would prepare an amended version of the draft convention;

(iii) the amended version will be presented to a forthcoming ICSPRO session with a view to establishing a group of experts among concerned international organizations (IOC, IMO, UN(OALOS), WMO);

(iv) the group of experts will then be entrusted with preparing a draft for submission to the appropriate organizations concerned.

363 The Assembly expressed its thanks to Prof. Kolodkin, the SMLA and the USSR for the work achieved so far on behalf of the Commission, and requested Prof. Kolodkin to report on this matter to EC-XXV.

9.2 CO-OPERATION WITH THE UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

364 The Secretary introduced this Agenda Item, referring to the Report on Intersessional Activities (Document IOC-XVI/6) and the Action Paper (Document IOC-XVI/8). He emphasized the fact that co-operation with UNEP was also addressed under several other Agenda Items.

365 He noted that the interaction with UNEP was extensive and covered a wide range of subjects, and was based on a series of agreements on Regional Seas as well as global activities.

366 At the present stage, a particular focus is being placed on developments in the Caribbean Region, notably the CEP POL programme with joint support for the outposting of an IOC Staff Member to the Regional Co-ordinating Unit for the Caribbean Action Plan in Kingston, Jamaica, to serve as co-ordinator of CEP POL, working in close co-operation with the IOC Secretariat for IOCARIBE in Cartagena, Colombia.

367 Another area of co-operation is the International Musselwatch, which is entering its operational phase with substantial support from IOC, UNEP and the United States through its National Oceanic and Atmospheric Administration (NOAA).

368 The Secretary also drew the attention of the Assembly to the increased demands on the Secretariat as well as the Expert Groups of the Commission arising from the need for timely and adequate response to the requirements of joint operations.

369 Finally, the Secretary emphasized the need for appropriate interaction between the communities of IOC and UNEP at the national level, so as to strengthen the co-ordination and execution of joint programmes.

370 The Representative of UNEP, Dr Stepjan Keckes, transmitted the best wishes of UNEP for a successful Sixteenth Session of the IOC Assembly, and expressed the satisfaction of UNEP with the increased co-operation between IOC and UNEP. He hoped that the collaboration would be further broadened and intensified.

371 He went on to describe three major, recent developments in this co-operation: the agreement on joint IOC-UNEP co-sponsorship of the GIPME programme, which would open up a new chapter of joint efforts with perspectives for a number of Regional Seas Programmes, as well as the International Musselwatch; the co-operation in the field of climatic change, embodied in the offer of IOC to co-sponsor the ten Regional Task Teams on Climatic Change, and the IOC-led Global Task Team on

Coral Reefs, as well as the joint effort with WMO in the establishment of a long-term monitoring programme for coastal and near-shore areas; and the analysis of the UNEP's and IOC's combined experience of programmes addressing the protection of the coastal and marine environment, also to be seen in the perspective of the preparations for the 1992 UNCED. He expressed the hope that this will eventually lead to the formulation of a common strategy for IOC and UNEP, to be applied in programmes on management of the marine environment, including living and non-living resources.

372 Finally, the Representative of UNEP expressed his concurrence with the desirability of enhanced co-ordination at the national level.

373 The Delegate of Portugal noted that the co-operation with UNEP could be seen as an example to be followed in interagency co-operation, and recommended that the Joint IOC-UNEP Intergovernmental Panel for GIPME, at its First Session, pay particular attention to developments at the regional level. He also noted that the participation of UNEP as an Observer in the Twenty-eighth Session of ICSPRO was very promising for future relations between UNEP and ICSPRO.

374 The Delegate of the Islamic Republic of Iran referred to the participation of IOC in the interagency working group on the oil spills in the ROPME sea area, as well as the *ad hoc* Working Group to be set up by IOC, and urged all Member States to provide active support.

375 The Assembly expressed its satisfaction with, and support for, the increasing co-operation, and its view that IOC could play a major role in the development of new joint programmes, such as the Regional Seas Programme for the Black Sea.

376 Some Delegates underscored the improved collaboration arising from co-ordination, on a national basis, of the inputs to the Governing Bodies of IOC and UNEP.

377 The Assembly expressed its satisfaction with the progress made in the development of joint efforts with UNEP, and instructed the Secretary to pursue the matter to achieve an increased and wider co-operation.

378 The Assembly adopted Resolution XVI-15.

9.3 CO-OPERATION WITH OTHER BODIES

Engineering Committee on Oceanic Resources (ECOR)

379 The Engineering Committee on Oceanic Resources operates by carrying out specific studies under contract or through working groups under the lead of interested countries. The current working groups whose work is at various stages of progress are : Marine Robotics (Canada lead), Self-Burial of Sub-sea Pipelines and Cables (The Netherlands), Large-Scale Clearing of Polluted Seabeds (UK), Small-Scale Ocean-Energy Systems (Japan) and a joint study with the Permanent International Session of Navigation Congresses (PIANC) on Marine Oil Pollution - Modelling and Practical Solutions (Norway and The Netherlands being the lead countries).

380 The President of ECOR, Mr. John Brooks, requested the Assembly to take note of the continuing interest of ECOR in acting as an advisory body on the technical programmes of the Commission: in particular, the development of advanced technology and automated instrumentation in the context of the development of the Global Ocean Observing System and any activities the Commission may wish to take up as part of the International Decade of Natural Disaster Reduction. ECOR is prepared to contribute directly to the TEMA requirements of the IOC. It has submitted to the IOC Secretariat copies of a draft report entitled "Ocean Engineering Education and Training - Oceanographic Technology" on the problem of training personnel in the use of oceanographic equipment. ECOR feels that its particular expertise in technical matters provides a valuable resource for the Commission in many important aspects of the TEMA programme.

North Pacific Marine Science Organization (PICES)

381 The Delegate of the USA, on behalf of Canada, China, Japan, USSR and of the USA itself, described a new international organization, the North Pacific Marine Science Organization (PICES), which will be established to promote and co-ordinate marine scientific research in the northern North Pacific Ocean and the Bering Sea. This was decided in Ottawa on 12 December 1990 when a draft Convention was approved by representatives of Canada, China, Japan, USA and USSR.

382 PICES will focus on research on the ocean environment and its interactions with land and atmosphere, its role in and response to global weather and climate change, its flora, fauna and ecosystems, its uses and resources, and the impacts upon it due to human activities. Such studies relate not only to the effects of fishing and environmental change on fish stocks but also to such issues as the impacts of oil spills and other forms of pollution and the eventual consequences of climate change for uses of the ocean and its resources. PICES will not be a resource or management organization; however, it may provide advice to other organizations on request.

383 After ratification by three of the five countries, the Convention will enter into force and other interested nations will be invited to accede. The PICES Secretariat will be located at the Institute of Ocean Sciences in Sidney, British Columbia. The first Chairman will be Professor Warren Wooster of the College of Ocean and Fishery Sciences, University of Washington. A scientific planning meeting will be held in Seattle some time in the second half of 1991.

384 IOC Member States were encouraged to join PICES at the appropriate time and to participate in the scientific meeting as observers. Future co-operation between PICES and the IOC will be encouraged, perhaps in a similar mode to that of the co-operation between IOC and ICES.

10. PREPARATIONS FOR THE 1992 UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

385 The Secretary introduced the Agenda Item, referring to Documents IOC-XVI/6, section 6, IOC-XVI/8, section 10, IOC-XVI/8 Annex 7 and IOC/OPC-IV/3S Add.

386 In accordance with the Resolution EC-XXIII.3 "IOC Contribution to the 1992 United Nations Conference on Environment and Development", adopted by the Executive Council at its Twenty-third Session (Paris, 7-14 March 1990), the Secretary IOC has continued IOC involvement in the preparatory process in order to ensure a significant contribution to the Conference with respect to the development of strategies for the protection and management of the global environment. The IOC contributions and inputs to the preparations cover a wide range of the IOC programme activities, including climate change and its impact, global ocean observing system development and strategies in connection with the problems associated with land-based sources of marine pollution.

387 Member States were informed of the results of the First Session of the Preparatory Committee for UNCED (Nairobi, 6-31 August 1990) through IOC Circular Letter No. 1278 dated 12 October 1990.

388 The First Session of the Preparatory Committee *"requested the Secretary-General of the Conference, drawing in particular upon the views expressed at the first session of the Preparatory Committee and upon the expertise available in the United Nations Environment Programme and all other relevant bodies, and taking account of all relevant paragraphs of General Assembly Resolution 44/228 of 22 December 1989, to submit to the Preparatory Committee at its second session a comprehensive report with recommendations for actions"* covering a wide range of subjects, in all 18 paragraphs of the Resolution.

389 During the meeting at the UNCED Secretariat, on 13 September 1990, it was suggested that these topics could be presented in six separate documents, eventually to be integrated into one strategy synthesis.

390 The Secretary IOC has organized the drafting of the two Documents for which the IOC is serving as "lead-agency", through consultants and through expertise available within the IOC Secretariat, on the basis of inputs from various groups contributing to the development of a global ocean-observing system and a global coastal-zone observing system (reference is made to Documents IOC-XVI/8 Annexes 3 and 4). The Documents cover: (i) impacts on coastal-zones and areas of possible climate changes; and (ii) the development of global ocean observations.

391 The First Session of the Preparatory Committee also requested the preparation of several other individual documents, to be prepared in consultation with the Secretary-General of the Conference, and requested him to report on progress to the Preparatory Committee at its Third Session. The IOC is responsible for the preparation, together with WMO and UNEP, of a document on ways and means of strengthening observation systems to protect oceans, through, *inter alia*, the establishment of a global ocean observing system.

392 The IOC was invited to co-operate in the Intergovernmental Meeting of Experts, to be held in Halifax, Canada, 6-10 May 1991, to develop general principles for the protection of the marine environment from land-based sources of pollution. The Secretary IOC, in consultation with the Canadian organizers of the Intergovernmental Meeting of Experts, has invited the Chairman of the Committee for GIPME, together with the Vice-chairman of GEMSI and other experts, to prepare background information on the basis of the experience of the GIPME programme since its inception at the Stockholm Conference in 1972, through Recommendations 46 and 87 of that Conference.

393 In the context of Working Group I of the Preparatory Committee, the UNCED Secretariat has established a Working Party on Climate and Climate Change. The Secretary IOC has expressed IOC's wish to participate in the work and to be kept fully informed about developments so as to be able to contribute to the preparations. The IOC has been invited to participate. The consultant working for IOC on this matter has established relevant contacts so as to ensure appropriate interfacing in the preparation of the Document on climate-change impacts. The Secretary has also discussed the development, in this subject area, with members of the WMO Secretariat.

394 The UNESCO strategy in the preparations for, and contribution to, UNCED 1992 makes reference to the role of the IOC in the context of the ocean environment. In particular the need is stressed for UNESCO to support the design and launching, by IOC, of a Global Ocean Observing System. It is, of course, also emphasized in the strategy that the cultural dimension is of great importance for the environment and development, as is education. Reference is made in this context to the TEMA Strategy and Action Plan (1991-1995) (Document IOC/TEMA-V/3, Annex III) with the development of a marine environmental education curriculum as part of the TEMA programme.

395 The Secretary drew the attention of the Assembly to the organization, by ICSU, of the Conference on an Agenda for Science for Environment and Development in the 21st Century (ASCEND 21), Vienna, Austria, 24-29 November 1991.

396 Another important element in the preparation of UNCED 1992 is that of National Reports. It is essential that, in the preparation of these Reports, reference be made to the need for ocean research, related services, training, education and mutual assistance, the development of partnerships and the opportunities provided through the marine environment and its resources in the development process.

397 To put in a strategic framework and highlight for IOC Member States the role of the IOC also in relation to the UNCED process and its follow-up, the Secretary, together with the Executive Director of UNEP, has invited a consultant to prepare a Strategy Document which takes into account relevant parts of the General Assembly Resolution 44/228 of 22 December 1989 (Document IOC/INF-841 prov.). The preparation of this strategy document is a joint initiative by the Executive Director of UNEP and the Secretary IOC; the draft of this Strategy Document is now before the IOC Assembly and is also expected to be presented to the UNEP Governing Council (in May 1991).

398 Finally, the Secretary drew the Assembly's attention to Document IOC/OPC-IV/3S Add. on a proposed draft statement for UNCED by the Sixteenth Assembly of the Intergovernmental

Oceanographic Commission. This had also been referred to under Agenda items 5.1.1 and 6.1.1, and a sessional drafting group had prepared a related Draft Resolution.

399 The Representative of UNEP confirmed that the paper on "Strategies for the protection and development of the oceans and coastal areas" (Document IOC/INF-841 prov.) is being prepared as a joint effort of the Secretariats of IOC and UNEP to summarize their experience in dealing with environmental issues in a developmental context, and to formulate strategies that may be suitable for the protection and development of the marine and coastal environment.

400 A large number of Delegates confirmed the great importance of this Conference. They emphasized that the IOC should participate fully in the preparatory work and should also make a contribution in its own right. They also agreed that the ocean's role in climate, global change and regional and local conditions must be reaffirmed.

401 **The Assembly stressed** the importance of, and opportunities inherent in, the oceans, including enclosed and semi-enclosed seas and coastal zones and their resources, for development and that their importance must be brought to the front. The role of science and technology must be emphasized and the related need for scientific and technological transfers to developing countries; IOC has a leading role to play in this context.

402 The Delegate of Brazil expressed his thanks to the Director-General of UNESCO, and stressed the importance of the afore-mentioned Conference not only from the environmental standpoint but also from that of development. With respect to the recommendation that Member States assume responsibilities in the preparation of the Conference, he observed that the significance of the solidarity of the IOC Member States should not be overlooked. Document IOC/INF-841 prov. does not fully reflect this fact, so that his Delegation believed IOC should assume the responsibility of presenting scientific documents in its own name as a contribution to the UNCED.

403 The Delegate of Mexico stated that one of the main objectives of the Conference will be the adoption of legal agreements to tackle real problems in the context of development.

404 The Delegate of Canada strongly supported the actions being undertaken by the Commission in preparation for the 1992 UNCED and noted in particular the role of the IOC in the Intergovernmental Expert Meeting on Land-Based Sources of Marine Pollution to be held in Halifax.

405 Several Delegates expressed concern about the balance of emphasis on development of ocean observations and monitoring in the open ocean, the coastal zone, enclosed and semi-enclosed seas. The importance of the coastal zone (land and sea) for most countries was stressed, and an input from the IOC to UNCED documentation concerning coastal-area development was requested.

406 Several Delegates referred specifically to Document IOC/INF-841 prov. (Strategies for the protection and development of the oceans and coastal areas; a draft) and welcomed the efforts made and the initiative taken by the IOC and UNEP Secretariats. It was emphasized that the draft Strategy Document deals with very important matters, that it is crisp and focussed, but that it cannot now be formally endorsed. In view of the complexity of the subjects dealt with, it may not be possible to obtain a formal endorsement of the whole Document. However, an Executive Summary, perhaps more appropriately referred to as a position paper, could be prepared, circulated and possibly endorsed in principle by the next Session of the Executive Council.

407 **The Assembly requested** the Secretary to continue the work on the Strategy Document in co-operation with the UNEP Secretariat and find appropriate ways of obtaining the views of Member States, communicate the result to Member States and promote an endorsement in principle of a summary in the form of a position paper at the next Session of the Executive Council.

408 **The Assembly agreed** that UNCED will provide a great opportunity to strengthen co-operation among States and between international organizations. **The Assembly requested** the Secretary

to ensure continued IOC involvement and a contribution from IOC in its own right, and advised Member States to help ensure this through appropriate actions, nationally and internationally.

409 The Assembly referred in particular to the development by IOC, in co-operation with WMO and UNEP, of global ocean and coastal-zone observations, and welcomed the opportunity provided by UNCED to give support to these developments, to be seen in a wider context as part of the UN Earthwatch System. Some Delegates referred to Document IOC/EC-XXIII/3 paras. 65-69 concerning the need for an agreed international annex, or instrument, which could be discussed either at UNCED or attached to the General Framework Convention on Climate Change, if appropriate. The need for this instrument had been strongly supported by the IOC *ad hoc* Group of Experts on GOOS at its meeting in Washington D.C., September 1990. The Committee on Ocean Processes and Climate, at its Fourth Session, in addition to supporting a Declaration to UNCED, also adopted a Resolution that recommended the preparation of an appropriate instrument, possibly as part of the Framework Convention, and IOC's continued involvement (Document IOC/OPC-IV/3S).

410 The instrument should provide the opportunity for Member States to enter into a formal agreement to support the development of GOOS. The Assembly requested the Secretary to continue to develop the draft Declaration (IOC/OPC-IV/3S Add.) for UNCED and elements for a draft Annex or instrument, as the case may be, for consideration either at UNCED or within the Framework Convention on Climate Change, if appropriate. The Assembly instructed the Secretary to keep Member States regularly informed of developments and to arrange for the dissemination of relevant documents or extracts thereof.

411 The Delegate of Malta informed the Assembly that his country wishes to propose at the Meeting of the Preparatory Committee for UNCED, now taking place in Geneva, that IOC be given the task of formulating a draft protocol on Oceans and Climate Changes and that Malta would be willing, if the need is so perceived, to offer its services (for example, by hosting an ad hoc meeting of experts) in the promotion of such a Protocol.

412 The Assembly decided to continue the co-operation with UNEP in the preparation of the Strategy Document and authorized the Secretary to use the necessary means to ensure continued strong involvement in all aspects of the preparation for UNCED within the IOC's sphere of competence.

413 The Assembly re-confirmed Resolution EC-XXIII.3, entitled "IOC Contribution to the 1992 United Nations Conference on Environment and Development". It also adopted Resolution XVI-16.

11. PROGRAMME AND BUDGET

11.1 PROGRAMME AND BUDGET FOR 1991

414 In introducing this Item, the First Vice-Chairman, Prof. Manuel Murillo, referred to the Status Report on the IOC Programme and Budget, Parts I and II (Document IOC-XVI/7) and information contained therein on financial aspects of the Commission's programmes. He recalled that, following a suggestion from the Secretary, the Twenty-third Session of the Executive Council had requested that information on income and expenditure be provided in two stages: an interim report in September of each year and a final report to be issued just prior to the Assembly or Executive Council.

415 As reflected in the background documentation, accelerated programme implementation in 1990, particularly on matters related to the Second World Climate Conference and preparations for the UN Conference on Environment and Development, had resulted in a 60% expenditure rate for the first year of the biennium. This implies that, unless greater resources are made available, some rephasing of activities is required for 1991, bearing in mind the priority areas identified by the Assembly.

416 The Assembly expressed its satisfaction with the actions taken by the Secretary in directing programme implementation during 1990 and instructed him to continue progressive implementation, in consultation with the Chairman.

11.2 DRAFT PROGRAMME AND BUDGET FOR 1992-1993

417 In introducing this Item, the First Vice-Chairman referred to the Proposal on the Draft Programme and Budget for 1992-1993 (Document IOC-XVI/8 Annex 8) and information contained therein which reflected the state of preparation of Sub-programme II.2.4 within the Draft UNESCO 26C/5. Particular reference was made to the new structure within UNESCO and the presentation of a unified marine science programme for the coming biennium.

418 The First Vice-Chairman also conveyed to the Assembly his general observations on trends which demonstrate the evolution of IOC and its strengthened role, both within UNESCO and within the broader ocean-science community. He recalled that, in 1987, when he became First Vice-Chairman, the IOC was just entering the phase where it was clear that the financial resources and staffing of the Commission came not only from UNESCO but also from Member States and IOC's partners within the UN System. While UNESCO at one point provided the vast majority of the IOC budget, the proposals for 1992-93 indicate that more than half of the anticipated resources will come from outside the IOC's parent body. This, as the Director-General has said on several occasions, is a clear indication that the Commission has recognized the challenge and has accepted that the exercise of functional autonomy carries with it increased responsibilities for IOC Member States to ensure that the approved programmes can be adequately carried out.

419 He also drew attention to the successful launching of activities, such as those related to the SWCC and UNCED, where the challenge is great and the time-frame within which IOC can prove its credibility is limited. Accelerated implementation of the Commission's programmes that relate to these processes, including their interface with coastal-area management and related training, education and mutual assistance, may imply that some rephasing of other activities will be required during the next biennium, in order to balance needs and resources. He called on Member States to help mobilize additional contributions to the IOC Trust Fund to ensure that the momentum of priority activities can be maintained and that rephasing of activities is kept to a minimum.

420 Attention was also drawn to the positive steps taken by UNESCO to absorb costs of five general-service posts but also to the continued deterioration in staffing as a whole due to the abolition of three professional posts at the headquarters level and the transfer of one general-service post to another unit.

421 **The Assembly took note** of the progress made in mobilizing extrabudgetary resources by investing, in a first stage, IOC funding in order to convince such sources that the Commission, in a credible fashion, can execute a wider range of activities, especially within the regional programmes and associated TEMA aspects.

422 In considering the proposed programme and budget of Sub-programme II.2.4, **the Assembly endorsed** the concerted objectives and outputs and general guidance regarding execution of the unified programme, on both those aspects for which the Secretary has a direct reporting function to the Director General, as well as those within the marine science related issues where co-ordination is maintained with the Assistant Director-General of UNESCO for Science.

423 Noting the succinct presentation of the Unesco Draft 26 C/5, **the Assembly instructed** the Secretary to include in future reports on programme implementation a clear indication of the complementarity of IOC activities and those on marine science related issues, with a view to assessing progress made in achieving greater coherency and increased efficiency.

424 The Delegate of Canada proposed that, in view of the complexity of the funding issues to be addressed, the Member States' Delegates to the Governing-Body Sessions would be helped by the establishment of a Sessional Committee on Programme and Budget, similar to the present Technical Review Committee for Resolutions that could assist the Plenary and the Secretariat in its work.

425 However, two delegations expressed reservations on such a project since it may lead to the creation of a new bureaucratic mechanism as well as create difficulties for small delegations to participate in the new Sessional Committee. They therefore favoured the maintenance of the present arrangements under which matters concerning Programme of Work and Budget are treated by an *ad hoc* sessional working group.

426 The Assembly decided not to take a decision on this matter at the present session, and referred the matter to the next session of the Executive Council, pending further study.

427 The Delegate of Ethiopia suggested that, in view of the fact that the Director-General has stressed the need for giving priority to Least Developed Countries and Africa, the needs of the Least Developed Countries in IOC matters need to be highlighted and accommodated in the Programme and Budget (26 C/5) to help them participate in IOC's endeavours.

428 While fully appreciating the efforts of the Director-General, and those of Member States in seconding staff, the Assembly drew attention to the continued critical staffing situation in the Secretariat.

429 Having noted the numerous offers made by Member States to host meetings, scientific conferences and training courses, as well as requests for assistance, the Assembly instructed the Secretary to take these into account in decisions on programme implementation.

430 The Assembly recognized that new and additional sources of funding were essential to fulfilling the role of the Commission and requested the *ad hoc* Study Group on Development, Operations, Structure and Statutes (see Resolution XVI-19) to take this into account in its work, especially on future institutional arrangements.

431 The Assembly requested the Chairman to maintain the custom of reporting to the Director-General of UNESCO on major issues related to the IOC, and now emphasized in particular the shortage of staff and the necessity for a UNESCO staff increase in the IOC Secretariat. The Assembly noted the success of this dialogue between the Chairman and the Director-General and expressed its appreciation and thanks to the Director-General for the very considerable support he has given and continues to give the IOC.

432 The Assembly adopted Resolution XVI-17.

12. ENHANCING THE ROLE OF THE COMMISSION

433 In introducing this Agenda Item, the First Vice-Chairman, Professor Manuel Murillo, presented the Summary Report of the Third Session of the *ad hoc* Study Group on Measures to Ensure Adequate and Dependable Resources for the Commission's Programme of Work (FURES; Document IOC/FURES-III/3). Referring to discussions during the Twenty-fourth Session of the Executive Council on the same subject, the First Vice-Chairman emphasized the major conclusions reached by the *ad hoc* Study Group, particularly on subjects related to: (i) functional autonomy, including matters related to the IOC Statutes and Rules of Procedures, (ii) the scheduling and organization of IOC Meetings, bearing in mind the respective roles of the Assembly and Executive Council; and (iii) future work to be undertaken by a similar *ad hoc* mechanism.

434 As a general conclusion, he conveyed the view of the *ad hoc* Study Group that, although its original mandate had been fulfilled to the extent possible, the nature and number of tasks assigned to it by the IOC Governing Bodies indicated the need for a similar, non-permanent body which could undertake an expanded study of some issues as well as new tasks as they arise. Two categories had been identified: one on matters related to ensuring adequate resources, and the other on adjustment of the IOC to meet new developments and challenges (as reflected, for example in the SWCC, IPCC and UNCED processes and results, and in the UN Convention on the Law of the Sea). Both these issues have

constitutional implications and support the need to continue work on legal aspects and associated matters, including review and eventual revision of the Rules of Procedure as a first priority, with subsequent adjustment to the IOC Statutes. Attention was also drawn to the fact that the IOC is recognized as a competent international organization within the UN Convention on the Law of the Sea (Annex II; Article 3(2) thereof).

435 In response to requests for further information on progress in clarifying the functional autonomy of the Commission, the Chairman IOC reported to the Assembly on the series of consultations he had had with the Director-General of UNESCO since the Twenty-third Session of the Executive Council in March 1990. An information paper on Developments Regarding IOC Functional Autonomy within UNESCO since the Twenty-third Session of the Executive Council (Document IOC-XVI/Inf.3), containing a compilation of the correspondence between the Chairman IOC and the Director-General as well as the relevant decisions of the Commission and UNESCO, was presented.

436 The Chairman expressed the view that the successive steps in negotiation had led to a most satisfactory and fruitful clarification as demonstrated by DG/Note/90/30 of 31 August 1990 and DG/Note/91/3 of 17 January 1991. The former had established a single administrative structure for the marine science programme of UNESCO under the "Office of the Intergovernmental Oceanographic Commission and marine science related issues" and had reaffirmed the functional autonomy of the Commission within UNESCO. The latter provided internal directives to UNESCO senior executives on the delegation of authority to the Secretary IOC, as agreed between the Chairman IOC and the Director-General.

437 During the ensuing debate a wide range of comments were made on all of the subjects addressed by the *ad hoc* Study Group. The Delegate of Argentina expressed the view that the idea contained in paragraphs 44 to 46 of the FURES Report is an erroneous one. Regional distribution conforms to criteria that reflect the balance and political configuration of the international community, rather than the idea of representing geographical elements such as marine and terrestrial areas. His Delegation would not therefore accept the fact that the original text of the Draft Resolution suggested abandoning the criterion of regional political distribution and replacing it by new ideas that, from his Delegation's point of view, will open up an extremely delicate and complex debate if too hurriedly advanced.

438 Having received the information provided by the Chairman on developments within UNESCO relevant to the exercise of IOC's functional autonomy, **the Assembly expressed** its satisfaction with the progress made and its appreciation to the Chairman IOC for his dedicated involvement and to the Director-General for his understanding and endorsement of IOC's proposals.

439 **The Assembly noted** that giving effect to the concept of functional autonomy is an evolutionary process that will naturally require further consultation and negotiation in the light of experience. Due recognition was given to the fact that the exercise of functional autonomy implies greater responsibilities for the Commission and its Member States in ensuring that the IOC follows up its commitments appropriately.

440 **The Assembly instructed** the Chairman and the Secretary to continue to explore those areas in which UNESCO procedures, when applied to IOC affairs, need to be adjusted to take into account the nature of IOC as an intergovernmental body with functional autonomy within UNESCO. Adequate documentation of adjusted policy should be reflected in the IOC Manual.

441 **The Assembly took note** of the assurance the Chairman had received that adjustments would be made to the Organizational Chart of UNESCO, within the context of the Draft 26 C/5, to reflect the functional autonomy of IOC.

442 **The Assembly confirmed its view** that an appropriate new title for the head of the IOC Secretariat should be sought to reflect better the functions and increased autonomy of the Commission.

443 Having considered the analysis made by the *ad hoc* Study Group of specific Rules of Procedure and of Articles in the IOC Statutes that may require adjustment, the Assembly agreed that this analysis should be pursued further.

444 The Assembly requested the Chairman to negotiate with the authorities concerned in Member States of IOC that are not Member States of UNESCO, to find a formulation acceptable to all concerning implementation of Article 10 of the Statutes.

445 Turning its attention to a long-standing and chronic problem faced by the Commission - insufficient resources - the Assembly considered préliminary suggestions for an IOC Pledging System and the establishment of a Fund for International Oceanographic Co-operation. Such a System is intended to offer a mechanism for provision of the additional funds required for effective implementation of the IOC programmes and related TEMA aspects, especially at the regional level. Reference was made to the World Heritage Fund established under Article 16 of the Convention on the Protection of the World Cultural and Natural Heritage (adopted in 1972 by the UNESCO General Conference at its 17th Session).

446 While Delegates expressed interest in all ways and means to increase the resource base of the Commission, emphasis was given to the need to accord priority to mobilization of the additional funding which would be required to maintain the momentum of programmes that had a bearing on the UNCED and SWCC processes. Some Delegates noted that clear identification of priority issues, within an overall strategy for the Commission, could assist their efforts at the national level.

447 Reference was made to the fact that a pledging system attached to a convention will require a certain time-frame for formulation, negotiation and signature and that this process might, in itself, bring higher visibility to the role of IOC at the governmental level.

448 The Assembly agreed that this subject should be further studied.

449 General satisfaction was expressed with the paper entitled "*The Intergovernmental Oceanographic Commission: A Strategy for the Future*" as a statement of IOC's planned response to current and anticipated challenges. Attention was drawn to the fact that some refinement of the Strategy was likely to emerge through developments related to SWCC and UNCED and that the inclusion of the Strategy as a formal text in the IOC Manual should be decided at a later stage.

450 The Assembly noted that the Strategy could serve as background material for IOC public-information purposes and should also assist contacts in Member States in increasing awareness of the Commission and its role. The Assembly agreed to proposed changes in the text to better reflect involvement in coastal-area management and the promotion and development of TEMA aspects.

451 The Assembly instructed the Secretary to disseminate the Strategy, as given in Annex VII hereto, to Member States and relevant international organizations for their use in promoting the Commission's role.

452 The Assembly decided that questions on the adequate implementation of the Strategy should be studied further.

453 The Assembly noted that a natural sequel to the Strategy would be the preparation of an IOC Action Plan and agreed that this should be further studied.

454 The Assembly recalled the impact of the International Conference on Ocean Research (Copenhagen, 1960) on the establishment of the IOC and its role in increasing governmental awareness of the importance of the ocean.

455 **The Assembly instructed** the Secretary to investigate the merits and feasibility of organizing an international conference on the theme of marine scientific research, ocean services and related aspects, bearing in mind possible follow-up to UNCED and the offer of Portugal to host the conference, possibly in 1994.

456 Consideration of the need to clarify the respective roles of the Assembly and the Executive Council generated considerable interest in terms of increasing the efficiency of these two bodies and, eventually, reducing the length of their meetings. Although there was general agreement on the principles proposed by the *ad hoc* Study Group, alternative suggestions were made to reduce the length of meetings, taking into account the need to maintain flexibility in establishing lists of speakers and the particular concerns of small delegations.

457 **The Assembly agreed** that Article 5, para. 3, of the Statutes should be more strictly adhered to and **decided** to address this point under Agenda Item 14, with a view to providing guidance to the Secretary on the drafting of the Provisional Agenda for the Twenty-fifth Session of the Executive Council.

458 **The Assembly also agreed** that its own Agendas should cover all IOC programmes and define general policy, whereas the Executive Council should concentrate on implementation and management aspects, bearing in mind that it must also be able to act on unexpected issues.

459 **The Assembly decided** that further study should be undertaken on the organization and scheduling of meetings of all IOC bodies as well as on the need to clarify reporting procedures. Noting the continued growth in the number of IOC subsidiary bodies, **the Assembly expressed** its wish that the study also address this issue and include, if appropriate, recommendations on their rationalization and concentration.

460 **The Assembly called attention** to the continued deterioration in the issuance of IOC documentation in all working languages of IOC, **and instructed** the Secretary to continue to negotiate with UNESCO on the establishment of a special IOC quota and other corrective measures.

461 **The Assembly considered** the list of modalities of support that Member States could provide to ensure the success of activities promoted and co-ordinated by the IOC (Annex VIII hereto) to be of considerable interest. While recognizing that this was an indicative list, **the Assembly drew attention** to its usefulness in identifying, at the national level, ways by which participation in IOC activities could be strengthened, and areas where further advice and assistance was required to facilitate the assumption of such responsibilities.

462 **The Assembly instructed** the Secretary to disseminate Annex VIII to Member States with a request that these responsibilities be borne in mind at the national policy level and with a request for Member States' views on areas where assistance were needed.

463 Noting the importance of strengthening or establishing National Oceanographic Committees or equivalent bodies, **the Assembly instructed** the Secretary to study the present situation and to remind Member States of the need to respond to Resolution XII-8 on the subject.

464 Having reviewed the proposals made by the *ad hoc* Study Group on Measures to Ensure Adequate and Dependable Resources for the Commission's Programme of Work, **the Assembly recognized** that the tasks assigned to the Group had been allowed to accumulate, **and it emphasized** that, in future, any similar mechanism should be established with specific responsibilities and a definite period during which it would be expected to complete its work. It was also suggested that designated experts and volunteer Member States could assist as required.

465 A sessional working group carefully analysed 36 actions proposed by FURES in order to identify those that could be: (i) undertaken by a future *ad hoc* mechanism; (ii) undertaken by an individual

expert or volunteer Member State willing to provide the necessary logistical support; or (iii) form part of the Summary Report of the Assembly as decisions or as instructions to the Secretary.

466 Following this analysis, consideration was given to the composition of a future *ad hoc* study group, based upon proposed terms of reference. Various views were expressed, bearing in mind previous practice of the Commission in the formation of similar bodies, the tasks to be addressed and the suggestion of the Twenty-fourth Session of the Executive Council to have a small, core membership and a definite period for completion of work. Emphasis was placed on the need to ensure the expert nature of the group as well as appropriate and timely presentation of developments so that Member States could inject their views. Recognizing that any reports and recommendations would be presented to the Governing Bodies for decision, the Assembly requested the Chairman of the present *ad hoc* Study Group to bear in mind the possibility of a one-day session prior to the Executive Council and/or Assembly for exploratory discussion, should the nature of certain recommendations so require.

467 The Assembly expressed its satisfaction with the work carried out by the *ad hoc* Study Group since its establishment by the Fourteenth Session of the Assembly in 1987 and conveyed to the First Vice-Chairman, the Members and the Secretariat its deep appreciation.

468 The Assembly adopted Resolutions XVI-18 and 19.

13. ELECTIONS

469 The Assembly noted the report of the Chairman of the Nominations Committee, Prof. C. Druet, informing the Assembly that all nominations received for the elections had been found valid. In addition, the Nominations Committee had requested some redrafting of Document IOC/INF-620 rev.2 (Technical Arrangements for the Elections of Officers of the Commission and Other Members of the Executive Council), and suggested some recommended procedures to deal with nomination forms.

470 Before the election of the Second Vice-Chairman, the Delegate of Portugal made the following statement on behalf of his Government.

> *"The nomination submitted by Portugal was envisaged in a different context, taking into account what has been, since its establishment, one of our Commission's concerns. By that I mean a great collective effort to insulate it from external tensions so that it could concentrate on our scientific work in the interest of the world community.*
>
> *The nominations made by the USA and, recently, the USSR, are indications of great changes taking place in the world and a sign that detente is being consolidated. Taking these favorable developments into account, my Government has decided to give every encouragement to this opportunity to strengthen international co-operation and to highlight its symbolic significance. My Government has therefore decided to withdraw our nomination for the post of Second Vice-Chairman. In so doing, we wish to see the East-West dialogue consolidated at the same time as a strengthening of the North-South dialogue. This is being done in the spirit of the partnership and mutual assistance that constitute one of our Commission's major objectives.*
>
> *We should like to thank those who encouraged us to submit a nomination and the many States from all regions who kindly gave us their support. I should like, in particular, to express our gratitude to France, a country that is a friend to Portugal and one to which I am very attached; through its enlightened action and the wisdom of its views, it has contributed greatly to the atmosphere of harmony within the Commission and to the progress the Commission has made.*
>
> *Before concluding, Mr. Chairman, I wish to point out, in accordance with the Commission's Rules of Procedure, that Portugal is a candidate for re-election to the Executive Council."*

13.1 ELECTION OF THE OFFICERS OF THE COMMISSION

471 The Assembly noted that there was only one candidate each for the posts of Chairman and First Vice-Chairman. The two candidates were elected by acclamation. There were two candidates for the post of Second Vice-Chairman, but, following the withdrawal of one candidature, the remaining candidate was elected by acclamation. There were two candidatures each for the positions of Third and Fourth Vice-Chairman and voting was organized to elect these Officers.

472 The newly elected Officers of the Commission are:

Chairman:	Dr. M.M. Murillo	(Costa Rica)
1st Vice-Chairman:	Dr. J. Knauss	(USA)
2nd Vice-Chairman:	Dr. A.P. Metalnikov	(USSR)
3rd Vice-Chairman:	Prof. Dr. H.K.A. Badawi	(Egypt)
4th Vice-Chairman:	Dr. G.S. Quraishee	(Pakistan)

13.2 ELECTION OF THE MEMBERS OF THE EXECUTIVE COUNCIL

473 The Assembly noted that 32 candidatures were found to be in order, to fill 29 seats on the Executive Council. Taking into account the withdrawal of one Member State, a vote was therefore organized to elect the Members of the Executive Council in accordance with Rule of Procedure 47.

474 The Member States sitting on the Executive Council as a result of the elections, as well as the list of Member States of the Commission, are given in Annex IV hereto.

14. DATES AND PLACES OF THE SEVENTEENTH SESSION OF THE ASSEMBLY AND THE TWENTY-FIFTH AND TWENTY-SIXTH SESSIONS OF THE EXECUTIVE COUNCIL

475 Following the proposal of the Secretary, the Assembly agreed that its Seventeenth Session should be held in Paris, starting 23 February 1993 and ending no later than 12 March 1993. The Twenty-sixth Session of the Executive Council, acting as the Steering Committee for the Assembly, should be held on 22 February 1993. The Assembly also agreed that the Twenty-fifth Session of the Executive Council should be held in Paris, from 10 to 18 March 1992.

476 The Assembly considered possible themes for the Bruun Memorial Lectures to be given at its Seventeenth Session, including: sea-level changes and their consequences, in particular for small island and low-lying States, emphasizing new scientific results on regional and sub-regional scales; preliminary results of an ocean-basin-wide acoustic tomography experiment, aiming at detecting global ocean temperature changes, and acting as an early warning system; application of scientific results to development, particularly in developing countries, with the related transfer of science and technology, especially in relation to coastal-zone management; global climate change and related ocean monitoring system development; resource development, engineering and natural hazards, possibly emphasizing the co-operation between IOC and other Agencies and Programmes (FAO, WMO, UNEP); matters related to TEMA could possibly be included in the various themes. It was agreed that the lectures should focus on science and scientific results.

477 It was also proposed that examples of technology transfer could be a theme for an extended demonstration during the Assembly, including hardware and software products, along the lines used during the present Assembly.

478 Finally, the Assembly invited Member States to submit further ideas on themes or titles for the Bruun Memorial lectures, in due course, so as to facilitate the presentation of a comprehensive programme to the Twenty-fifth Session of the Executive Council.

479 Recalling its decision to consider items for the Agenda of the Twenty-fifth Session of the Executive Council, and to observe a more strict application of Article 5(3) of the Statutes, the Assembly agreed that many of the items that should be included on that Agenda had emerged during the debates; it also agreed that the Secretary should be able to identify such items, and others arising from the Commission's work as a whole, and that he could consult, as necessary, with the Officers to ensure a complete but balanced Agenda for EC-XXV.

15. ADOPTION OF THE SUMMARY REPORT

480 The Assembly adopted the Summary Report of this Session, together with nineteen Resolutions (Annex II, hereto).

16. CLOSURE

481 The Delegate of Pakistan, as Chairman of the Technical Review Committee for Resolutions, specifically thanked the Committee members for their very hard work in reviewing the nineteen Draft Resolutions submitted for consideration by the Assembly. It was possible to do this work in time because of the co-operation of the Secretariat which has provided quick references and cross references, particularly on intergovernmental panels. There was a general feeling amongst the Members of the Resolutions Committee and amongst the members of the Assembly that there too many Draft Resolutions had been submitted. The number could have been reduced if some of the Resolutions, on similar or related subjects had been combined. The Resolutions Committee is not itself able to combine Resolutions since these are put to the Committee one after the other. He proposed that, in future, the sessional drafting groups should attempt to put up one Resolution on all closely linked subjects. The Secretariat assistance in this regard would be very useful.

482 Several Delegations expressed their appreciation and thanks to the IOC Chairman for his leadership of the session and his untiring efforts for the Commission during his tenure of office.

483 Through the Chairman-elect, Professor Manuel Murillo, the Assembly expressed its vote of thanks and admiration for the outgoing Chairman.

484 The Chairman responded by recalling those aspects of his and the Commission's work that had retained his attention the most. First, there were his regular and fruitful consultations with the Director-General as part of a continuing process of giving ever greater effect to IOC's functional autonomy. Then there was the adoption of the Comprehensive Plan for a Major Assistance Programme to Enhance the Marine Science Capabilities of Developing Countries. Thirdly, the IOC's Ocean Services had developed considerably, so that IOC was becoming an operational body, and this trend would continue as efforts were deployed to develop, *inter alia*, the Global Ocean Observing System. He recorded his appreciation of the two Secretaries with whom he had worked during his Chairmanship.

485 He specifically thanked the IOC Documentalist and the Assembly Secretariat for the excellent support services they had provided, and the interpreters for their excellent work in the rather esoteric fields covered by the Commission.

486 The Chairman closed the Sixteenth Session of the Assembly at 12.30 on 21 March 1991.

ANNEX I

AGENDA

1. OPENING

2. BRUUN MEMORIAL LECTURES

3. ADMINISTRATIVE ARRANGEMENTS

   3.1 ADOPTION OF THE AGENDA
   3.2 DESIGNATION OF THE RAPPORTEUR
   3.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

4. REPORT ON THE COMMISSION'S ACTIVITIES, 1989-1990

   4.1 SECRETARY'S REPORT ON INTERSESSIONAL ACTIVITIES
   4.2 REPORT ON THE COMMISSION'S ACTIVITIES IN 1989-1990

5. OCEAN SCIENCES

   5.1 THE OCEAN'S ROLE IN CLIMATE AND GLOBAL CHANGE: OCEAN PROCESSES AND CLIMATE

      5.1.1 Fourth Session of the IOC Committee on Ocean Processes and Climate
      5.1.2 Eleventh Session of the SCOR-IOC Committee on Climatic Changes and the Ocean
      5.1.3 Study of Tropical Oceans and Global Atmosphere (TOGA)
      5.1.4 World Ocean Circulation Experiment (WOCE)
      5.1.5 Ocean Dynamics and Circulation on the Continental Shelf
      5.1.6 Other Climate and Global Change Related Ocean Studies
      5.1.7 The Second World Climate Conference and the Intergovernmental Panel on Climate Change
      5.1.8 IGBP Ocean-Related Projects (including JGOFS)

   5.2 OCEAN SCIENCE IN RELATION TO LIVING RESOURCES (OSLR)

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

   5.4 OCEAN MAPPING

   5.5 MARINE POLLUTION RESEARCH AND MONITORING (GIPME/MARPOLMON) AND RELATED PROGRAMMES

   5.6 MARINE ACOUSTICS

6. OCEAN SERVICES

   6.1 GLOBAL OCEAN-OBSERVING SYSTEMS

      6.1.1 Global Ocean Observing System (GOOS)
      6.1.2 Global Sea-Level Observing System (GLOSS)
      6.1.3 Global Coastal Zone and Shelf Seas Observing System
      6.1.4 Drifting-Buoy Co-operation Panel (DBCP)
      6.1.5 Integrated Global Ocean Services System (IGOSS)

6.2 PREPARATION OF GLOBAL OCEAN DATA-SETS

6.2.1 Global Temperature-Salinity Pilot Project (GTSPP)
6.2.2 Ocean Personal Computer Project (OCEAN-PC)
6.2.3 New Technologies for Data and Information Exchange

6.3 TSUNAMI WARNING SYSTEMS AND RELATED MARINE NATURAL DISASTERS

7. **TRAINING, EDUCATION AND MUTUAL ASSISTANCE IN THE MARINE SCIENCES (TEMA)**

8. **REGIONAL SUBSIDIARY BODIES AND CO-OPERATION**

8.1 JOINT CCOP-IOC WORKING GROUP ON POST-IDOE STUDIES OF EAST ASIAN TECTONICS AND RESOURCES (SEATAR) and JOINT CCOP/SOPAC-IOC WORKING GROUP ON SOUTH PACIFIC TECTONICS AND RESOURCES (STAR)

8.2 IOC REGIONAL COMMITTEE FOR THE SOUTHERN OCEAN (IOCSOC)

8.3 MATTERS ARISING IN OTHER REGIONAL SUBSIDIARY BODIES

8.3.1 IOCARIBE
8.3.2 WESTPAC
8.3.3 IOCINCWIO
8.3.4 IOCINDIO
8.3.5 IOCEA
8.3.6 Collaboration with ROPME
8.3.7 Other Regions

8.4 MEDITERRANEAN

9. **CO-OPERATION WITH OTHER ORGANIZATIONS OF THE UNITED NATIONS SYSTEM AND OTHER BODIES**

9.1 THE INTER-SECRETARIAT COMMITTEE ON SCIENTIFIC PROGRAMMES RELATING TO OCEANOGRAPHY (ICSPRO)

9.1.1 Twenty-eighth Session of ICSPRO
9.1.2 Study of Legal Aspects of Ocean Data Acquisition Systems (ODAS)

9.2 CO-OPERATION WITH THE UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

9.3 CO-OPERATION WITH OTHER BODIES

10. **PREPARATIONS FOR THE 1992 UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT**

11. **PROGRAMME AND BUDGET**

11.1 PROGRAMME AND BUDGET FOR 1991

11.2 DRAFT PROGRAMME AND BUDGET FOR 1992-1993

12. ENHANCING THE ROLE OF THE COMMISSION

13. ELECTIONS

13.1 ELECTION OF THE OFFICERS OF THE COMMISSION

13.2 ELECTION OF THE MEMBERS OF THE EXECUTIVE COUNCIL

14. DATES AND PLACES OF THE SEVENTEENTH SESSION OF THE ASSEMBLY, AND THE TWENTY-FIFTH AND THE TWENTY-SIXTH SESSIONS OF THE EXECUTIVE COUNCIL

15. ADOPTION OF THE SUMMARY REPORT

16. CLOSURE

ANNEX II

RESOLUTIONS

Resolution XVI-1

PROTECTION OF GLOBAL CLIMATE FOR PRESENT AND FUTURE GENERATIONS OF MANKIND

The Intergovernmental Oceanographic Commission,

Noting Recommendation OPC-IV.5 of the Fourth Session of the IOC Committee on Ocean Processes and Climate on this matter,

Welcoming United Nations General Assembly (UNGA) resolutions 43/53 of 6 December 1988 and 44/207 of 22 December 1989 which recognized that climate change is a common concern of mankind,

Noting with satisfaction that United Nations General Assembly resolution 45/212 of 21 December 1990 established an Intergovernmental Negotiating Committee for the preparation of a framework convention on climate change, containing appropriate commitments, and any related instruments that might be agreed upon, and invited relevant bodies of the United Nations system to make appropriate contributions to the negotiating process,

Taking into account the progress made at the First Session of the Intergovernmental Negotiating Committee which was held in Washington in February 1991,

Reconfirms and expresses its continued interest in contributing, in its own right, to the negotiating process for the preparation of a framework convention on climate change, and any related instruments that might be agreed upon;

Instructs the Secretary to follow the process and make every effort to ensure IOC participation in its own right in the sessions of the Intergovernmental Negotiating Committee;

Calls upon its Member States to facilitate the participation and recognition of the role of IOC through appropriate national and international actions.

Resolution XVI-2

SUPPORT FOR THE WORLD OCEAN CIRCULATION EXPERIMENT (WOCE)

The Intergovernmental Oceanographic Commission,

Recalling Resolution XV-2, which established Institutional Arrangements for WOCE, including the setting up of the Intergovernmental WOCE Panel (IWP),

A

Taking into account the Report and Recommendations of the First Session of the IOC-WMO Intergovernmental WOCE Panel and the Executive Summary and Recommendations of the Fourth Session of the IOC Committee on Ocean Processes and Climate,

Reaffirms the importance of WOCE for climate change studies;

Emphasizes its concern that many of the indicated contributions to WOCE are still partial or tentative and **agrees** with the assessment of the WOCE Scientific Steering Group that certain important WOCE objectives will not be met unless the scope of these commitments is broadened and their timing made firm;

Urges Member States that have already made commitments to WOCE to meet these fully, maintain their timing and momentum, and enhance them where possible;

Calls upon Member States not currently doing so, to consider how they could initiate support to WOCE;

Requests the WOCE International Project Office (IPO), in collaboration with the IOC and WMO Secretariats, to assess how well data acquisition programmes such as the World Weather Watch, IGOSS, IODE and GLOSS are meeting WOCE requirements, and to report its findings through the Intergovernmental WOCE Panel to the Committee for Ocean Processes and Climate;

Instructs the Secretary IOC, in collaboration with the Chairman of the WOCE Scientific Steering Group and the Director of the WOCE International Project Office, to circulate to Member States a scientifically justified statement accompanying specific requests for resources and assistance in the implementation of this Resolution requesting further support.

B

Noting that the Committee on Earth Observations Satellites (CEOS), which was created on the recommendation of the Economic Summit of Industrialized Nations, is one focal point for international coordination of those global change activities associated with space-based earth observations;

Instructs the Secretary IOC to arrange for co-ordination with CEOS and appropriate satellite agencies, with a view to maintaining phasing between WOCE field programmes and satellite missions, such as ERS-1, TOPEX/POSEIDON and ERS-2, as well as to enhancing and focussing space agency earth observation mission planning on oceanographic requirements.

Resolution XVI-3

WORLD CLIMATE PROGRAMME CO-SPONSORSHIP

The Intergovernmental Oceanographic Commission,

Recognizing that the Ministerial Declaration of the Second World Climate Conference stressed the need to strengthen international co-operation in support of the World Climate Programme (WCP),

Noting that the Second World Climate Conference recognized the need for an improved data base of oceanic parameters for operational climate forecasting and recommended that a global ocean observing and data management system be developed,

Noting also the active participation of IOC in the oceanographic components of the World Climate Research Programme (WCRP), such as TOGA, WOCE,

Noting further the related decisions of this Assembly to establish the Global Ocean Observing System as a major component of the Global Climate Observing System,

Decides to offer to co-sponsor the WCP, and WCRP in particular, and instructs the Secretary to bring this offer to the attention of the Governing Bodies of WMO and ICSU;

Invites the Governing Bodies of WMO and ICSU to give favourable consideration to IOC co-sponsorship of WCP;

Requests the Chairman and the Secretary to consult with the Executive Heads of WMO and ICSU with a view to negotiating the financial, staffing and other implications of such co-sponsorship.

Resolution XVI-4

AD HOC INTERGOVERNMENTAL PANEL ON HARMFUL ALGAL BLOOMS

The Intergovernmental Oceanographic Commission,

Recalling that the IOC, at the Fourteenth Session of its Assembly, endorsed the development of the sub-programme on Harmful Algal Blooms, and that the Twenty-third Executive Council, through its Resolution EC-XXIII.1, endorsed the programme development so far,

Being aware of the increasing socio-economic risks posed by toxic algae and harmful algal blooms to marine organisms, fisheries, aquaculture, human health and the coastal environment,

Approves the formation of an *Ad hoc* Intergovernmental Panel on Harmful Algal Blooms, with the Terms of Reference shown in the Annex hereto;

Invites FAO to co-sponsor the *Ad hoc* Panel;

Invites Member States which intend to be involved in the implementation of a programme on Harmful Algal Blooms to nominate their representatives for the *Ad hoc* Panel and inform the Secretary IOC accordingly;

Decides to review, at the Seventeenth Session of the Assembly, the Terms of Reference of the *Ad hoc* Panel, in conjunction with the Commission's review of the overall organization of the OSLR Programme;

Instructs the Secretary to convene the First Session of the *Ad hoc* Panel as soon as possible.

Annex to Resolution XVI-4

Terms of Reference of the *Ad Hoc* Intergovernmental Panel on Harmful Algal Blooms

1. FUNCTIONS

The *Ad hoc* Intergovernmental Panel on Harmful Algal Blooms is established to meet the scientific, managerial, implementation, and resource needs of the Harmful Algal Blooms Programme.

The Panel will carry out the following functions:

1.1 Review and identify programme requirements;

1.2 Promote efficient and cost-effective implementation of the HAB programme and prepare recommendations on this implementation to the Assembly and Executive Council;

1.3 Identify the resources necessary to meet HAB programme needs;

1.4 Ensure effective interaction and communication with regional intergovernmental (e.g., ICES, ICSEM and GFCM) as well as regional and global non-governmental (e.g., SCOR) organizations involved in research on toxic algae and harmful algal blooms; and

1.5 Report to the Twenty-fifth Session of the Executive Council and the Seventeenth Session of the Assembly.

2. COMPOSITION

The membership of the *Ad hoc* Panel is open to Member States of IOC (and FAO, if it agrees to co-sponsor the Panel) which have declared to the Secretary IOC their involvement or intention to participate in the development and implementation of the Harmful Algal Bloom Programme on a global, regional, or national scale. The Panel shall include the Chairman of the OSLR Guiding Group of Experts, representatives of IOC regional and other subsidiary bodies, and of other interested international organizations, particularly SCOR. Invitations to participate in Panel activities may be extended to scientific experts at the request of the Panel and with the approval of the Secretary of the IOC.

3. ORGANIZATION OF THE SESSIONS

3.1 The Panel will, prior to the closure of each Session, elect from its members a Chairman who will serve in that capacity until the closure of the next Session.

3.2 The Sessions shall, in principle, be arranged without financial costs to IOC. Sessions will be conducted, documentation will be provided, and the report of each session will be prepared in English and in other working languages of the Commission as appropriate and required.

3.3 Secretariat support for the Panel will be provided by the Secretary IOC.

Resolution XVI-5

INTERNATIONAL BATHYMETRIC CHART OF THE WESTERN PACIFIC (IBCWP)

The Intergovernmental Oceanographic Commission,

Noting the Recommendation of the Meeting of the *ad hoc* Group of Experts on Ocean Mapping in the WESTPAC Area (Tianjin, China, 12-14 June 1990) to undertake the preparation of an International Bathymetric Chart of the Western Pacific,

Decides to establish an Editorial Board for the International Bathymetric Chart of the Western Pacific, with the Terms of Reference annexed to this Resolution;

Instructs the Secretary to: (i) invite Member States of the WESTPAC region and other interested Member States to submit candidatures of experts to be considered for membership of the Editorial Board; (ii) invite China to nominate a Chief Editor for the IBCWP, and to designate a national institution to provide the Chief Editor with the full support he will need to carry out his responsibilities for review and quality control of the sheet compilations; and (iii) seek extrabudgetary funds for this activity;

Invites the International Hydrographic Organization, and its regional bodies, especially the East Asian Hydrographic Commission, to work in close collaboration with the Editorial Board for IBCWP on matters related to the assembly of available bathymetric data and the compilation of material for inclusion in the international series of nautical and bathymetric charts in the region.

Annex to Resolution XVI-5

Terms of Reference for the Editorial Board for the International Bathymetric Chart of the Western Pacific

The IOC Editorial Board for the International Bathymetric Chart of the Western Pacific shall:

1. BASIC FUNCTIONS

Supervise the preparation and publication of the IOC International Bathymetric Chart of the Western Pacific (IBCWP) using all available bathymetric data as input to the series, taking into account, in particular, the holdings of the World Data Centre for Bathymetry (IHO), the IHO Data Centre for Digital Bathymetry and the World Data Centre "A" (Marine Geology and Geophysics), and subsequently consider the need to prepare and publish geological/geophysical series of the same areas.

2. PROGRAMME DEVELOPMENT

2.1 PLANNING

Prepare a detailed plan of action for carrying out the project and activities, to be submitted to the IOC Consultative Group on Ocean Mapping (CGOM) for its consideration.

2.2 PROMOTION

Promote the IBCWP and related supporting activities in the Member States of the IOC Sub-Commission for the Western Pacific (SC-WESTPAC) and in their marine scientific communities.

2.3 CO-ORDINATION

Identify the participants (institutions, individual scientists and experts), keeping them informed of the actions that each of them is expected to undertake in the implementation of the IBCWP and on activities being carried out by the other participants so as to avoid duplication of effort and to optimize results.

2.4 SCIENTIFIC AND TECHNICAL ADVICE

Advise the participants, as appropriate, of the methods and procedures to be used in carrying out the work related to the agreed project and activities, and on any methodological questions falling within the Editorial Board's sphere of competence.

Advise the Member States of the SC-WESTPAC on the requirements, with respect to the preparation of the international bathymetric chart, for Training, Education and Mutual Assistance in the Marine Sciences (TEMA) related to the WESTPAC region, and advise the IOC of these requirements.

2.5 COLLABORATION

Collaborate with the IOC Consultative Group on Ocean Mapping concerning the technical specifications for the IBCWP, taking into account the draft "Specifications for the IBCWP" drawn up by a Group of Experts in June 1990.

2.6 EVALUATION

Evaluate progress in the implementation of agreed projects and activities, with a view to proposing new approaches or new directions in the light of results achieved.

3. OTHER FUNCTIONS

3.1 TECHNICAL POLICY

Advise the Member States participating in the IBCWP on technical requirements for the effective implementation of the agreed projects and activities for the achievement of the Editorial Board's objectives in this field.

3.2 REPORTING

Present a Report on the scientific and technical aspects of its activities and progress to each session of the Consultative Group on Ocean Mapping, and also inform the SC-WESTPAC on developments and progress with preparation of the IBCWP.

Resolution XVI-6

MARINE POLLUTION RESEARCH AND MONITORING (GIPME/MARPOLMON) AND RELATED PROGRAMMES

The Intergovernmental Oceanographic Commission,

Having considered the Summary Report of the Seventh Session of the Committee on the Global Investigation of Pollution in the Marine Environment,

Recognizing that very considerable resources are required for the adequate implementation of the Second GIPME Action Plan,

Noting the establishment by this Assembly of the IOC *ad hoc* Group of Experts on Comprehensive Marine Scientific Research and Monitoring of the Black Sea (Resolution XVI-7),

Taking into account that regional marine pollution monitoring programmes often require a considerable investment in comprehensive technical assistance in order to optimize strategies and techniques and to facilitate appropriate technology transfer (through training, specialized supplies and instrumentation) and follow-up support in order to generate applicable and comparable data,

Decides: (i) to accept the Report; (ii) to approve Recommendations GIPME-VII.1 to 8; and (iii) to approve the Second GIPME Action Plan;

Notes with satisfaction the continued cooperation with other organizations, particularly UNEP, IAEA(ILMR), IMO and ICES;

Reaffirms its strong satisfaction with UNEP's co-operation in GIPME, including the mechanisms to facilitate co-sponsorship, and **encourages** UNEP, at the XVIth Session of its Governing Council, to formally approve the co-sponsorship of GIPME;

Urges Member States and other organizations and bodies to initiate and extend their efforts to identify resources and, through a co-ordinated allocation or offer of resources - human, financial, and material (ships, instruments, etc.) - contribute to the implementation of the Second GIPME Action Plan;

Invites the co-sponsoring agencies, with IOC, UNEP, IAEA and IMO, to deploy available resources, in a co-ordinated way, for the timely implementation of the Second GIPME Action Plan;

Recognizes the changing perspectives on marine pollution issues and therefore **instructs** the Secretary IOC to undertake, in consultation with the GIPME Officers, a review of the operational elements of GIPME's Marine Pollution Monitoring System (MARPOLMON), to assess priorities for future programme formulation and execution.

Resolution XVI-7

BLACK SEA PROJECT

The Intergovernmental Oceanographic Commission,

Noting the accelerating deterioration of the environmental quality of the Black Sea Basin,

Recognizing the increasing urgency for a comprehensive programme for the protection and development of the marine and coastal areas of the Basin, including the living and non-living resources,

Recalling Resolution EC-XXIII.4 inviting UNESCO, UNDP, UNEP and other interested organizations to consider providing assistance, in co-operation with IOC, to the countries of the region in implementation of a regional project for the Black Sea,

Taking into consideration the advanced stage of the negotiations on the conclusion of a regional Convention on the Protection of the Marine Environment of the Black Sea as a legal framework for co-operation of all coastal states in the area,

Noting that the Seventh Session of the Committee for GIPME recommended that IOC take the lead in implementing the marine pollution research and monitoring component of the UNEP-IOC Action Plan for the Black Sea, once the plan is established by UNEP,

Taking into account the decision of the 1990 Session of the UNEP Governing Council requesting the development of a Regional Seas Action Plan for the Black Sea and the confirmed interest of the coastal countries to participate in the development and implementation of the Action Plan,

Noting also the agreement reached at the Twenty-eighth Session of ICSPRO to use IOC as a technical co-ordinating body and joint specialized mechanism of the ICSPRO agencies in dealing with the Action Plan, particularly its marine scientific components,

Bearing in mind that initiatives and proposals on the Black Sea Regional Project were elaborated by an international expert team at the meeting held in St. Kiriko (Bulgaria, May 1990), as well as by the USSR State Committee for Environmental Protection, and submitted to IOC and UNESCO,

Instructs the Secretary to pursue an executive role for the IOC with respect to the development of the scientific basis of a Regional Seas Action Plan for the Black Sea;

Further instructs the Secretary to undertake consultations with UNEP and other interested organizations, with a view to organizing jointly with UNEP, the first meeting of the officially designated focal points of the Black Sea countries for the development of the Regional Seas Action Plan;

Encourages the Member States, UNESCO, UNEP and other interested organizations to facilitate elaboration and implementation of a scientific research and monitoring component of the Black Sea Programme, including, *inter alia*, the marine component of the "UNESCO-Chernobyl" Programme and, to this effect, establishes an IOC *ad hoc* Group of Experts on Comprehensive Marine Scientific Research

and Monitoring in the Black Sea, with Terms of Reference for the *ad hoc* Group of Experts to be developed in consultation with Member States of the region, and in co-operation with other interested international organizations within the context of the GIPME Programme.

Resolution XVI-8

GLOBAL OCEAN OBSERVING SYSTEM (GOOS)

The Intergovernmental Oceanographic Commission,

Considering that a Global Ocean Observing System (GOOS) should ultimately be able to supply enough data to support the evaluation of natural and human-induced climate changes and for the long-range forecasting of weather and climate over the whole planet, as well as regional predictions of ocean conditions for fisheries, coastal-zone management, and pollution studies, for use by Member States,

Recognizing that development of a Global Ocean Observing System is one of the most significant challenges facing the Commission,

Recognizing further that this system must be built as far as possible on existing programmes and capabilities and must be continually updated and improved in response to the results of ocean research programmes and the development of new technology,

Decides to undertake development of a Global Ocean Observing System (GOOS);

Establishes a GOOS Support Office in the IOC Secretariat, under the direction of the Secretary IOC, with the functions outlined in the Annex hereto;

Charges the Committee on Ocean Processes and Climate with overseeing the effective co-ordination of the initial planning and development of GOOS, taking into account scientific advice received from the CCCO-JSC Ocean Observing System Development Panel;

Instructs the Secretary, in consultation with the Chairmen of the relevant subsidiary bodies, taking into account all options, including the Committee on Ocean Processes and Climate, to develop a proposal on the form and structure of an appropriate long-term intergovernmental mechanism for co-ordinating GOOS, and to report to the Seventeenth Session of the Assembly;

Endorses the concept of a Steering Committee and Planning Office for a Global Climate Observing System (GCOS) **and decides** to work with other interested international organizations to establish and support such a Committee and Office;

Proposes that the GOOS Support Office should form the oceanographic component of the projected GCOS Planning Office **and invites** WMO, UNEP, ICSU and CEOS to co-operate with the IOC in the planning and development of the GOOS and to co-ordinate relevant elements of their existing ocean observing programmes and systems with those of the IOC within the context of the GOOS;

Instructs the Secretary to bring to the attention of the Director-General of UNESCO the need to provide staff and financial resources for the planning and development of the Global Ocean Observing System and particularly for establishment of the GOOS Support Office by July 1991;

Urges Member States to second staff, provide financial resources, as required, and support developing countries through TEMA and other sources.

Annex to Resolution XVI-8

Functions of the IOC GOOS Support Office

The GOOS Support Office will:

1. Review and analyse scientific and observational requirements for the GOOS and prepare draft recommendations on how the Global Ocean-Observing System should be implemented to meet these needs;

2. Review and analyse existing and new ocean observation and data management systems and capabilities and prepare draft recommendations on their modification, expansion and/or improvement in support of the GOOS;

3. Identify requirements for technical assistance and training related to the GOOS, and prepare draft recommendations for their implementation;

4. Assist the Committee on Ocean Processes and Climate and the Secretary IOC to interact with the GCOS Planning Office and other international organizations, as appropriate, on GOOS-related issues.

5. Make initial estimates of the costs and benefits of GOOS in terms of existing activities, new activities, utilization of satellites and other value-added services, and propose a procedure for periodic review and revision of the predicted costs and benefits, including the costs of technical assistance and training.

Note: Approval of this resolution was preceded by a review of:

(i) **IOC Resolution XV-4** and **EC-XXIII.5** on the need to design and plan a global ocean-observing system;

(ii) **WMO Resolution 11(EC-XLI)** on the need for development of a global ocean observing system in support of climate monitoring, prediction, and research;

(iii) the recommendations of the Intergovernmental Panel on Climate Change and the **Second World Climate Conference** on the need to establish a Global Climate Observing System; and

(iv) the **UNESCO Third Medium-Term Plan (1990-1995)**, which states that *"the development of ocean services will be greatly accelerated leading to a 'global integrated ocean observing system' ('World Ocean Watch'), in support of marine research and ocean use, as a common service to Member States and their scientific community".*

and by a review of the following proposals received by the Sixteenth Session of the IOC Assembly:

(i) the Summary Report of the First Session of the IOC *ad hoc* Group of Experts on an Ocean Observing System (Washington DC, USA, 6-7 September 1990) and the document "Toward a Global Ocean Observing System: A Strategy" prepared by the *ad hoc* Group of Experts;

(ii) the report of the First Session of the Joint CCCO-JSC Ocean Observing System Development Panel (Alexandria, Virginia, USA, 10-12 September 1990);

(iii) the **Proposal on the Long-Term Global System of Monitoring Coastal and Near-Shore Phenomena Related to Climate Change**, prepared by the UNEP-IOC-WMO Meeting of Experts (Paris, 10-14 December 1990) and the recommendations of the meeting;

(iv) the proposal for a **Global Climate Observing System** (GCOS) prepared by an *ad hoc* group sponsored by WMO, IOC and ICSU (Winchester, UK, 14-15 January 1991); and

(v) the **Status Report** on existing ocean elements and related systems (Doc. IOC/INF-833).

Resolution XVI-9

GLOBAL SEA-LEVEL OBSERVING SYSTEM (GLOSS)

The Intergovernmental Oceanographic Commission,

Having reviewed the Executive Summary and Recommendations of the Fourth Session of the IOC Committee on Ocean Processes and Climate,

Noting the Malé Declaration on Global Warming and Sea-Level Rise adopted by the Small States Conference on Sea-Level Rise, and the statement of the Venice Conference on "Impact of Sea-Level Rise on Cities and Regions", and the importance of GLOSS data to address the concerns expressed in these documents,

Noting also the requirements of ongoing scientific programmes and forthcoming satellite altimetric measurements,

Approves the GLOSS Work Plan for 1991-1993 as proposed by the Second Session of the IOC Group of Experts on GLOSS;

Recognizes the need for a continued leading role of IOC in the co-ordination of GLOSS and the need for funds and staff to implement the Work Plan mentioned above;

Urges the IOC Member States to identify and provide the funds, staff and equipment required for implementation of the GLOSS Work Plan, particularly for its technical assistance and training programmes;

Instructs the Secretary IOC to respond favourably to the invitation to provide support for GLOSS participation in the follow-up of the above-mentioned Malé Declaration and the Venice Conference;

Invites the Chairmen of IOC Regional Subsidiary Bodies to consider the development of GLOSS regional components at their forthcoming meetings, and particularly **invites** the Chairmen of WESTPAC and IOCINDIO to consider designating GLOSS Regional Co-ordinators;

Emphasizes the importance of evaluating critically the accuracy of the sea- level measurements using established and newly developed technology, particularly satellite altimetry;

Calls upon the IOC Member States to provide *in situ* sea-level data from GLOSS stations to the international data centres without delay in accordance with the provisions of the GLOSS Implementation Plan;

Also calls upon the IOC Member States to inform the Secretary IOC as soon as possible of their plans to install and/or reactivate the high-priority GLOSS stations, as determined by the Group of Experts on GLOSS.

Resolution XVI-10

SYSTEM OF LONG-TERM MONITORING OF COASTAL AND NEAR-SHORE PHENOMENA RELATED TO CLIMATE CHANGE

The Intergovernmental Oceanographic Commission,

Recalling that the IOC Executive Council, at its Twenty-third Session, emphasized the need to develop ocean-observation and measurement programmes conducted on all scales, including coastal and near-shore regions,

Noting that the Second World Climate Conference recommended the establishment of a coastal-zone research and monitoring programme to identify the effects of climate change on the coast and coastal ecosystems,

Noting also the calls by the UNEP-WMO Intergovernmental Panel on Climate Change (IPCC) and by the Small Island States through the Malé Declaration,

Recognizing that integrated coastal-zone studies must be based on a systematic programme of data and information acquisition and analysis concerning the potential impacts of climate change on the coastal zones,

Noting also the endorsement, by the Fourth Session of the IOC Committee on Ocean Processes and Climate, of the proposed programme and the related specific recommendations on implementation,

Adopts the goals and objectives of the System of Long-Term Monitoring of Coastal and Near-Shore Phenomena Related to Climate Change, as proposed by the joint IOC-UNEP-WMO meeting of a Group of Experts;

Recommends the implementation of the pilot phase through the IOC regional bodies and the jointly sponsored UNEP-IOC Regional Task Teams on the implications of climate change and sea-level rise, in consultation with other relevant programmes and activities of IOC, UNEP and WMO, and as a contribution to the Global Ocean Observing System, the Global Climate Observing System and to the proposed future IOC Programme on Ocean Dynamics and Circulation on the Continental Shelf;

Decides that IOC continue to conduct assessments of the vulnerability of countries, particularly developing countries, to sea-level changes, to participate in IPCC workshops and task teams, as appropriate and to inform the Chairman of IPCC of IOC's on-going and planned activities in this area;

Invites the WMO and UNEP to co-operate with IOC in the implementation of this Resolution.

Resolution XVI-11

CO-ORDINATION OF COASTAL-ZONE PROGRAMMES AND ACTIVITIES

The Intergovernmental Oceanographic Commission,

Noting with satisfaction the growing interest shown by Member States to increase the role of IOC in activities related to the development and protection of coastal areas and their renewable and non-renewable natural resources, as contained in the OSLR and OSNLR Programmes and in the proposal for the System of Long-Term Monitoring of Coastal and Near-Shore Phenomena Related to Climate Change,

Being aware that this trend is likely to accelerate and diversify as a result of the impacts of climate changes and variations in sea level on the coastal zone and its resources,

Recognizing that, by its nature and characteristics, the study of the coastal zone and its resources requires a multidisciplinary approach which demands the participation of several types of national body and technical assistance and co-operation from governmental and non-governmental international organizations,

Recognizing with satisfaction the notable increase in co-operation among governmental and non-governmental international bodies,

Being concerned by the frequent duplication of programmes and projects on the same problems,

Calls upon Member States to identify on a regional basis those common problems that might be the subject of co-ordinated studies;

Invites governmental and non-governmental international organizations interested in the coastal zone and its natural resources to exchange information on all relevant global and regional programmes that they are conducting in such zones in different countries and regions and to improve their co-operation in that regard;

Instructs the Secretary IOC to co-ordinate the coastal-zone programmes of the Office of the "Intergovernmental Oceanographic Commission and marine science related issues" and to prepare a report in that regard for submission to the next session of the Executive Council.

Resolution XVI-12

STRENGTHENING OF THE EDUCATION AND TRAINING OF HIGH-LEVEL SPECIALISTS IN BASIC MARINE SCIENCES

The Intergovernmental Oceanographic Commission,

Recalling that one of the basic objectives of IOC is to promote the education of scientists for the proper implementation of marine scientific research programmes and related services,

Recalling further that, in the developing countries, specialists in marine science and technology can serve as catalysts at the national and regional level for the education and training of new generations of marine scientists and technicians,

Recognizing the growing need of developing Member States for high-level specialists in basic marine sciences in general and in physical oceanography, chemical oceanography and marine geology in particular, and **bearing in mind** the increasing economic difficulties experienced by those countries in producing such specialists by their own efforts,

Requests that the IOC Committee for TEMA prepare an *ad hoc* programme for the education and training of high-level specialists at the master's and doctoral level in basic marine sciences in general and in physical oceanography, chemical oceanography and marine geology in particular;

Further requests that IOC's subsidiary bodies, both sectoral and regional, include in each of their programmes and projects a substantive TEMA component;

Invites developed Member States to offer fellowships and other support (equipment, books, publications, logistics) to the developing countries for the education and training of high-level specialists in their universities and higher research institutions;

Instructs the Secretary to make representations to governmental and non-governmental agencies with a view to obtaining assistance, in support of the programme for the education and training of high-level specialists in basic sciences.

Resolution XVI-13

STRENGTHENING THE TEMA PROGRAMME

The Intergovernmental Oceanographic Commission,

Having reviewed the Summary Report of the Fifth Session of the Committee for Training, Education and Mutual Assistance in Marine Sciences, and particularly the Draft TEMA Strategy and Action Plan for 1991-1995 therein,

Stressing that the Commission is not only intensifying its activities in long-established programmes, but is also embarking on major new endeavours, such as the creation of a Global Ocean Observing System, the study of Coastal Ocean Dynamics and Fluxes, and Integrated Coastal Area Management,

Recognizing that the substantial gap in marine scientific and technological capabilities between the developed and the developing countries persists, and may even be growing in spite of efforts so far to reduce it,

Recognizing also that this gap is not likely to be reduced unless a serious international effort is made to provide the necessary training, education and mutual assistance in the marine sciences on a scale well beyond the Commission's present resources,

Acknowledging that the long-term objectives of sustainable development, which will be the main subject of the forthcoming UN Conference on Environment and Development, to be held in Brazil in 1992, could only be met, as far as the oceans are concerned, by a major effort to enhance the marine science capabilities of the developing countries,

Welcoming the steps being taken to promote the implementation of the UNESCO-IOC Comprehensive Plan for a Major Assistance Programme to Enhance the Marine Science Capabilities of Developing Countries, and the efforts to mobilize the required financial and other forms of support, such as the convening in Lisbon of a high-level meeting by the President of Portugal in 1991,

Accepts the Summary Report of the Fifth Session of the IOC Committee for Training, Education and Mutual Assistance in Marine Sciences held in Paris, 25 February to 1 March 1991 with the comments and corrigenda introduced by the Assembly;

Adopts the Recommendations contained in the above-mentioned Report, noting only that the additional *ad hoc* meeting should only be convened if necessary;

Further adopts the TEMA Strategy and Action Plan for 1991-1995, and its Addendum;

Invites the Director-General of UNESCO to consider, as a matter of urgency, the establishment of a professional post as the Head of the TEMA programme in the Secretariat, to carry out activities to which IOC has allocated the highest priority;

Calls on its Member States to strengthen the capabilities of the IOC Secretariat, through experts, to help promote and co-ordinate the major new effort required;

Also calls on Member States to make available to developing countries, through the VCP: (i) experts to assist them in marine science and technology, in developing the required capabilities, including the

maintenance and operation of equipment and research vessels, and (ii) equipment needed to facilitate effective participation in the Commission's programmes;

Also calls on its Member States to contribute to the IOC Trust Fund to accelerate the implementation of the TEMA Strategy and Action Plan for 1991-1995, to ensure IOC's effective participation in the preparations for the meeting in Portugal in 1991 and for the UN Conference on Environment and Development in Brazil in 1992, and the follow-up of these major international events;

Decides to convene the Sixth Session of the IOC Committee for TEMA, before the Seventeenth Session of the IOC Assembly, and to hold future sessions at two year intervals in order to ensure continuity in the implementation and review of the TEMA Programme;

Invites other international organizations, foundations and individuals directly involved in marine affairs, to collaborate with the Commission in the implementation of the TEMA Strategy and Action Plan for 1991-1995.

Resolution XVI-14

OCEANOGRAPHIC CO-OPERATION WITHIN THE ROPME SEA AREA[1]

The Intergovernmental Oceanographic Commission,

Noting with great concern the recent environmental catastrophe caused mainly by the massive oil spill in the ROPME Sea Area, burning oil wells in Kuwait and other countries in the area, as well as other pollutants,

Realizing the grave consequences thereof, and the adverse impact on the marine and coastal environments and national resources, on local and regional scales, as well as the immediate and long-term effects,

Being aware of the fragility of the ecosystem in this semi-enclosed basin and the need for co-operation among IOC Member States from within, and outside the region, to mitigate these adverse effects of the massive oil spill, other pollutants, and the atmospheric input from the oil fires into the marine environment,

Having been informed of the damage to the oceanographic research and service infrastructures,

Taking account of IOC participation in the preparation of an Interagency Action Plan by UN Specialized Agencies for the area,

Decides to undertake, on an urgent basis, a special ocean research and monitoring programme consistent with this Action Plan, to assess the adverse effects of the massive oil spill, burning oil wells in Kuwait and other countries in the area, and other pollutants, as a contribution to the related national and international efforts, and in co-operation with UN Agencies, UNEP and ROPME, consistent with the above-mentioned Action Plan;

Further decides to establish an *ad hoc* Working Group on Oceanographic Co-operation in the ROPME Sea Area, in consultation with the IOC Member States of the region, with the Terms of Reference set forth in the Annex to this Resolution;

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[1] Members of the Regional Organization for the Protection of the Marine Environment (ROPME): Bahrain, Islamic Republic of Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

Instructs the Secretary to: (i) urgently take the necessary steps to convene the *ad hoc* Working Group to co-ordinate the organization of oceanographic and monitoring cruises; and (ii) convene in 1992 or 1993, with the technical support of GIPME, an international scientific conference on the oceanography and marine ecology of the region in relation to the flux, fate and effects of all kinds of pollutants, in co-operation with the Member States of the region and with the support of Member States of the Commission;

Calls on Member States of IOC to contribute: (i) to the re-establishment and upgrading of the oceanographic laboratories and reconditioning of research vessels; (ii) to IOC efforts to respond to the emergency situation in the region by contributing to the IOC Trust Fund; and (iii) to provide training opportunities, expert services, equipment and technology transfer in the framework of TEMA and IOC-VCP.

Annex to Resolution XVI-14

Terms of Reference of the *Ad hoc* Working Group on Oceanographic Co-operation within ROPME Sea Area

The *Ad hoc* Working Group on Oceanographic Co-operation in the ROPME Sea Area shall endeavor to carry out the following tasks during the intersessional period, which include, *inter alia*:

(i) the assessment of the magnitude of the problems arising from the adverse effects of the massive oil spill in the region, oil fires, and any other pollutants;

(ii) the definition of the objectives of the proposed programme, giving special attention to matters related to the protection of the marine and coastal ecosystems, and to problems, the solution of which requires oceanographic research and services, and/or international co-operation;

(iii) the promotion, development and co-ordination of the required marine scientific research programmes and related activities;

(iv) the design of a short-term and a long-term strategy for carrying out the obligations of IOC in the most effective way;

(v) providing advice on a short-term and long-term plan for IOC's contribution to the implementation of an overall work plan being developed in co-operation with UN Agencies, UNEP and ROPME;

(vi) co-operation with other technical and regional subsidiary bodies of the Commission such as GIPME and IOCINDIO on technical matters and relevant supporting measures;

(vii) facilitation of the exchange of scientific data and information, transport of scientific equipment, and movement of research vessels and monitoring platforms;

(viii) provision of general guidance as a mechanism for the Member States to mobilize support for the programme, in the form of contributions to the IOC-Funds-in-Trust and IOC-VCP, or as extra-budgetary projects to be implemented by IOC;

(ix) assistance with the identification of training, education and mutual assistance needs relevant to the objectives of the programme;

(x) monitoring progress during the intersessional period, and making recommendations to the governing bodies of the Commission on policy matters and proposals on the budgetary and other forms of support required for the programme.

Membership shall be open to all interested Member States of the Commission willing to participate in the work of the *ad hoc* Working Group and/or contribute to its oceanographic programme.

Resolution XVI-15

CO-OPERATION WITH THE UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

The Intergovernmental Oceanographic Commission,

Considering the number of important joint initiatives of UNEP and IOC, and the development, in collaboration with WMO, of a global coastal-zone observing system,

Being mindful of the development of major, global observing programmes, and their regional components,

Reiterating the commitment to the establishment of a joint IOC-UNEP Intergovernmental Panel for GIPME,

Noting with satisfaction the successful co-sponsorship by IOC of the regional task teams on climate change and sea-level rise and the associated regional assessments,

Instructs the Secretary to continue the development, jointly with UNEP, of a long-term common basis for co-operation and joint action between UNEP and IOC at all levels.

Resolution XVI-16

PREPARATION FOR THE 1992 UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

The Intergovernmental Oceanographic Commission,

Recalling Resolution EC-XXIII.3 on the IOC contribution to the 1992 United Nations Conference on Environment and Development,

Noting with satisfaction the active participation of IOC representatives in the work of the Preparatory Committee for UNCED and in the preparation of documentation for UNCED,

Considering the great importance attached to the development of observations and monitoring of the oceans, shelf seas, the coastal zone, enclosed and semi-enclosed seas, for climate and global change and the state of the health of the ocean and the importance of addressing all these components at UNCED,

Noting also Recommendation OPC-IV.3 of the Fourth Session of the IOC Committee on Ocean Processes and Climate on the preparation of a draft declaration for adoption at the 1992 UNCED that would encourage countries to contribute to the development and implementation of the comprehensive Global Ocean Observing System,

Emphasizes the importance of using UNCED and its preparatory committees in increasing awareness of the role of the ocean in the global environment and of the importance of ocean resources, in order to encourage national commitments to a Global Ocean Observing System;

Approves the attached Statement and Declaration for UNCED and **requests** the Chairman of IOC to bring this Statement and Declaration to the attention of the 1992 UNCED for its adoption;

Urges Member States to bring this Statement and Declaration to the attention of their national representatives to the 1992 UNCED;

Encourages the continued development, in co-operation with WMO and UNEP, of such observations and monitoring, also seen in the context of the development of the Earth Watch System;

Instructs the Secretary to continue active IOC involvement in the work of the UNCED Preparatory Committee.

Annex to Resolution XVI-16

Statement for UNCED by the Sixteenth Assembly of the Intergovernmental Oceanographic Commission
Paris, France, 7-22 March 1991

The Sixteenth Assembly of the Intergovernmental Oceanographic Commission of UNESCO, deeply concerned with the need to improve understanding and prediction of the physical state and health of the ocean and its role in environmental change and economic development, requests the United Nations Conference on Environment and Development to consider and adopt the declaration in the Conclusion to the present Appendix.

Introduction

1. The oceans cover nearly three-fourths of the earth's surface and are essential to the health of life on this planet. A substantial and increasing proportion of the global population live within the influence of the coastal zone. Our understanding of ocean processes is developing rapidly through the implementation of several major research programmes. Yet we need significantly expanded data on the marine environment to understand the physical and chemical processes involved, the interaction with the atmosphere, the complex coastal, benthic and deep-ocean ecology or the anthropogenic impacts that are taking place.

2. The ocean plays a key role in determining the earth's climate. The ability to understand and predict weather and climate beyond a few weeks requires that ocean behaviour be taken into account. It may soon be possible to describe and predict many aspects of ocean behaviour with enough accuracy to improve significantly climate, weather and fishery forecasts. This achievement can be realized only if appropriate observations of the oceans are made systematically and the data and analyses disseminated promptly.

3. Global changes affect coastal areas. In addition to natural climate change and variability, present evidence of anthropogenic environmental change in the ocean and the atmosphere, involving a number of physical, chemical and biological processes, portends significant socio-economic impacts. Monitoring and predicting such changes is a prerequisite to establishing adaptive policies. Mankind's timely and effective response to changes will largely depend on the quality of information on the rate and magnitude of change at regional and global scales.

Intergovernmental Decisions

In order to address these needs, a number of intergovernmental organizations have adopted policies to respond to these challenges.

4. UN General Assembly Resolution 44th Session, Second Committee, 22 December 1989, states that "Protection of the oceans and all kinds of seas, including enclosed and semi-enclosed seas, and of coastal areas and the protection, rational use and development of their living resources" and "Protection of the atmosphere by combatting climate change, depletion of the ozone layer and transboundary air pollution" is of major concern in maintaining the quality of the global environment (A/C.2/44/L.86).

5. The Second World Climate Conference (29 October-7 November 1990) adopted conclusions and recommendations which indicate an urgent need to create a Global Climate Observing System (GCOS). The Conference Statement noted the importance of developing a Global Ocean Observing System of physical, chemical and biological measurements as one basis for a GCOS, and cited the importance of both space-based and surface-based observing components. The Conference also indicated that a GCOS should meet the needs for climate system monitoring, climate change detection and response monitoring, especially in terrestrial ecosystems; data for application to national economic development; and research towards improved understanding, modelling and prediction of the climate system.

6. The UNESCO Third Medium Term Plan (1990-1995), which the UNESCO General Conference adopted at its 25th Session, (November 1989), includes a commitment to substantially accelerate existing ocean observing activities for research and operational uses.

7. Many millions of people living in low-lying coastal, deltaic and island environments are threatened by sea level rise and storm surges. Small island states are particularly vulnerable. The Malé Declaration on Global Warming and Sea-Level Rise, adopted at the Small States Conference on Sea-Level Rise held in Malé, Republic of Maldives, (14-18 November 1989), proposes the establishment of a climate and sea- level monitoring network.

Action taken

8. In response to these decisions, the Intergovernmental Oceanographic Commission has decided to pursue a major intergovernmental initiative to develop a Global Ocean Observing System required for monitoring and predicting environmental changes to meet global, regional and national interests. This system, to be co-ordinated by IOC, will provide for regular observations of major physical, chemical and biological properties of the World Ocean, including the coastal zone and enclosed and semi-enclosed seas. It will address such issues as global climate predictions and sea-level rise, as well as the coastal marine environment problems of Member States. Initial implementation will use existing intergovernmental programmes and will be continually updated and improved with the addition of new elements in response to the results of ocean research programmes and development and transfer of new technology.

9. Established operational ocean observing systems can provide the basis for the development of a comprehensive, integrated system. This system needs to be improved and augmented by ocean remote sensing, an expanded sea-level network, wide use of automated observational systems and the incorporation of new technology. Development of systems for routine biological and chemical measurements is required. The international system for collection and exchange of data and data products should be further improved. Standards need to be established.

10. Substantial training, education and mutual assistance efforts must be undertaken to establish partnerships with developing countries. Training must be provided, and exchange of technology and products should be encouraged. The full implementation of GOOS will result in a significant increase in observing elements and therefore it should be recognized that a significant assistance programme is required.

11. Close and permanent interaction is required with the international scientific community, including the International Council of Scientific Unions. Specifically, large-scale research programmes such as the Study of Tropical Ocean and Global Atmosphere, the World Ocean Circulation Experiment and the Joint Global Ocean Flux Study will ensure the sound scientific basis for GOOS design and the application of GOOS data for analysis and prediction of the state of the marine environment.

12. Climate-related components of the Global Ocean Observing System will be developed jointly with the World Meteorological Organization as the ocean component of the Global Climate Observing System; coastal and near-shore monitoring components related to climate change will be developed jointly with the United Nations Environment Programme and the World Meteorological Organization.

13. A Global Ocean Observing System requires continuous and systematic data gathering, exchange, processing, and distribution of products, with the addition of operational funding and resources to the scientific base. Existing activities tend to be driven by research programmes rather than operational needs, and include a diverse array of platforms, agencies and programmes. Existing monitoring and data exchange systems have, however, substantial gaps in spatial and temporal coverage that would be needed to meet climate-scale and environmental monitoring needs.

Conclusion

14. Therefore, the Member States of the Intergovernmental Oceanographic Commission recommend that the Conference adopt the following statement:

Declaration on a Global Ocean-Observing System

Recognizing the key role of the oceans in determining the earth's climate, and recognizing the present evidence of anthropogenic environmental changes in the oceans, the Conference assigns a high priority to planning, implementing and maintaining a Global Ocean Observing System for the collection, analysis and distribution of data and information from the oceans and all kinds of seas, including enclosed and semi-enclosed seas, and from coastal areas. This system should be based on the principle of free and open exchange of data and the resulting information and benefits. The Conference requests the Intergovernmental Oceanographic Commission to continue the development of this system, in co-operation with other international organizations. The Conference urges countries to support this system through their national facilities and services based on the principle that each country participate, according to its means, so that all countries may benefit.

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)
Member States of the Commission (117)
(as of 11 March 1991)

AFGHANISTAN
ALGERIA
ANGOLA
ARGENTINA
AUSTRALIA
AUSTRIA
BAHAMAS (The)
BANGLADESH
BARBADOS
BELGIUM
BENIN
BRAZIL
BULGARIA
CAMEROON
CANADA
CAPE VERDE
CHILE
CHINA
COLOMBIA
CONGO (The)
COSTA RICA
COTE D'IVOIRE
CUBA
CYPRUS
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
DENMARK
DOMINICAN REPUBLIC (The)
ECUADOR
EGYPT
ETHIOPIA
FIJI
FINLAND
FRANCE
GABON
GAMBIA
GERMANY
GHANA
GREECE
GUATEMALA
GUINEA
GUINEA-BISSAU
GUYANA
HAITI
ICELAND
INDIA
INDONESIA
IRAN, ISLAMIC REPUBLIC OF
IRAQ
IRELAND
ISRAEL
ITALY
JAMAICA
JAPAN
JORDAN
KENYA
KUWAIT
LEBANON
LIBYAN ARAB JAMAHIRIYA (The)
MADAGASCAR
MALAYSIA
MALDIVES
MALTA
MAURITANIA
MAURITIUS
MEXICO
MONACO
MOROCCO
MOZAMBIQUE
MYANMAR
NETHERLANDS (The)
NEW ZEALAND
NICARAGUA
NIGERIA
NORWAY
OMAN
PAKISTAN
PANAMA
PERU
PHILIPPINES (The)
POLAND
PORTUGAL
QATAR
REPUBLIC OF KOREA (The)
REPUBLIC OF YEMEN
ROMANIA
SAMOA
SAUDI ARABIA
SENEGAL
SEYCHELLES
SIERRA LEONE
SINGAPORE
SOLOMON ISLANDS
SOMALIA
SOUTH AFRICA (Suspended)
SPAIN
SRI LANKA
SUDAN (The)
SURINAM
SWEDEN
SWITZERLAND
SYRIAN ARAB REPUBLIC (The)
THAILAND
TOGO
TONGA
TRINIDAD & TOBAGO
TUNISIA
TURKEY
UKRAINIAN SOVIET SOCIALIST REPUBLIC (The)
UNION OF SOVIET SOCIALIST REPUBLICS (The)
UNITED ARAB EMIRATES
UNITED KINGDOM OF GREAT BRITAIN & NORTHERN IRELAND (The)
UNITED REPUBLIC OF TANZANIA (The)
UNITED STATES OF AMERICA (The)
URUGUAY
VENEZUELA
VIETNAM
YUGOSLAVIA

In accordance with its Statutes the Intergovernmental Oceanographic Commission is a functionally autonomous body within the United Nations Educational, Scientific and Cultural Organization (UNESCO). The purpose of the Commission is to promote marine scientific investigations and related ocean services, with a view to learning more about the nature and resources of the oceans through the concerted actions of its Members. One function is to promote, plan and co-ordinate observing and monitoring systems on the properties and quality of the marine environment, as well as the preparation and dissemination of processed oceanographic data and information, and of assessment studies.

Resolution XVI-17

PROGRAMME OF WORK AND BUDGET FOR 1992-1993

The Intergovernmental Oceanographic Commission,

A

Having considered the Proposal on the IOC Programme of Work and Budget for 1992-93, contained in Document IOC-XVI/8 Annex 8 and particularly its Table I,

Having been informed of the Director General's decision to establish a unified marine science programme for Unesco under the Office of the Intergovernmental Oceanographic Commission and marine science related issues.

Noting that the IOC Programme of Work and Budget contains components to be funded through: (i) Unesco (Draft 26 C/5: Sub-programme II.2.4); and (ii) contributions to the IOC Trust Fund and other sources,

Noting further that additional resources, in the order of 35 percent, would be required for sustained, satisfactory implementation for all of the IOC Programmes,

Approves, as a minimal basis for future planning, the proposal for the IOC Programme and Budget for 1992-93;

B

With regard to Member States,

Noting that the resources made available to the Commission through voluntary contributions of Member States to the IOC Trust Fund, secondment of staff and in-kind support substantially contribute to effective implementation of IOC Programmes,

Being aware of the need to fulfill the responsibilities of IOC and to maintain the momentum of programmes that contribute to the follow-up to the 1990 Second World Climate Conference and preparations for the 1992 United Nations Conference on Environment and Development,

Acknowledges, with appreciation, the advance indications by Member States of further contributions and support;

Urges Member States to increase their efforts to provide adequate funding and staff, through contributions to the IOC Trust Fund and other means, if possible with indication of commitment over a period of time;

Instructs the Secretary to implement progressively the IOC Programme of Work and Budget, taking into account decisions of the Assembly and Executive Council, and priority areas related to studies of ocean dynamics and climate, and related global and coastal ocean observing system development;

Further instructs the Secretary to draw to the attention of the Twenty-fifth Session of the Executive Council any difficulties regarding funding and staff resources so that planned programme implementation may be rephrased should the circumstances so require;

Also instructs the Secretary to consider and submit to the Twenty-fifth Session of the Executive Council a study on possible arrangements for a sessional committee of the Assembly to consider programme and budgetary matters;

C

With regard to UNESCO,

Having received with appreciation the statement from the Director General that an additional sum of $500 000 has been foreseen for activities within the Draft 26 C/5,

Recognizing that through the establishment of a single, unified programme, the IOC has increased responsibilities to ensure greater coherency and increased efficiency in programme implementation, using available resources,

Having been informed of the proposed staffing for the Office of the Intergovernmental Oceanographic Commission and marine science related issues within the Sub-programme II.2.4 of the Draft 26 C/5,

Recalling Resolution XV-11 by which the IOC drew to the attention of the Director-General that he should accord the highest priority to IOC staffing requirements so as to ensure that the IOC Secretariat has a core staff funded through UNESCO to serve effectively programme implementation and facilitate the integration of staff provided by Member States,

Noting with appreciation the positive results of the periodic exchange of information between the Chairman IOC and the Director-General,

Reaffirms the high priority accorded by the Commission to activities in support of study, observation and management of coastal areas and training, education and mutual assistance, including higher education in marine sciences;

Conveys its appreciation to the Director-General for the additional programme activity funds contained within the Draft 26 C/5 for Sub-programme II.2.4 and for transferring to the regular programme budget the costs of five general service posts heretofore borne by the IOC Trust Fund;

Reiterates, however, that the staffing situation for professional posts has continued to deteriorate;

Invites the Director-General to consider, possibly through internal adjustments within the overall UNESCO staff positions, establishment of at least two senior professional posts for training, education and mutual assistance and for global and coastal observing system development;

Requests the Chairman to bring these matters to the attention of the Director-General and to continue their periodic meetings and exchanges of information about the development of the IOC;

Calls on Member States to take energetic action through appropriate national channels so as to ensure that the Commission's views are taken into account during debate at the UNESCO Executive Board and General Conference;

Invites the Director-General to transmit this Resolution to the 136th Session of the UNESCO Executive Board and to the Twenty-sixth Session of the Unesco General Conference.

Resolution XVI-18

AD HOC STUDY GROUP ON MEASURES TO ENSURE ADEQUATE AND DEPENDABLE RESOURCES FOR THE COMMISSION'S PROGRAMME OF WORK

The Intergovernmental Oceanographic Commission,

Recalling the establishment by the Assembly at its Fourteenth Session, through Resolution XIV-20, of an *ad hoc* Study Group on Measures to Ensure Adequate and Dependable Resources for the Commission's Programme of Work,

Noting the tasks assigned to the *ad hoc* Study Group through Resolutions XIV-20, XV-12 and EC-XXIII.9, as well as guidance provided by the Fourteenth and Fifteenth Sessions of the Assembly and the Twenty-third and Twenty-fourth Sessions of the Executive Council,

Recognizing that the work accomplished by the *ad hoc* Study Group on FURES provided invaluable material for the clarification of IOC's functional autonomy as well as for other matters,

Having reviewed the Summary Report and the recommendations of the Third Session of the *ad hoc* Study Group on FURES, both in regard to tasks which have been completed as well as those requiring further study (Document IOC/FURES-III/3),

Accepts the Summary Report of the Third Session of the *ad hoc* Study Group;

Calls the attention of the Director-General to the urgent need to ensure, especially for the IOC Governing Bodies, a better balance in the issuance of IOC documentation in all four working languages of the Commission;

Requests the Director-General to reflect in the UNESCO Organizational Chart his decisions on the status of IOC;

Approves the proposed text on "The Intergovernmental Oceanographic Commission: A Strategy For the Future" (Annex VII of the Summary Report) as a general statement of the Commission's planned response to current and anticipated challenges in all aspects of ocean-related matters;

Approves as an indicative list the "Modalities of Support that Member States could Provide to Ensure the Success of Activities Promoted and Coordinated by the IOC" (Annex VIII of the Summary Report);

Decides that the work of the *ad hoc* Study Group on Measures to Ensure Adequate and Dependable Resources for the Commission's Programme of Work has been satisfactorily completed and that the Group is now dissolved.

Resolution XVI-19

STUDY OF IOC DEVELOPMENT, OPERATIONS, STRUCTURE AND STATUTES

The Intergovernmental Oceanographic Commission,

Having considered the recommendations on subjects requiring further investigation as proposed by the *ad hoc* Study Group on Measures to Ensure Adequate and Dependable Resources for the Commission's Programme of Work,

Being convinced that subjects identified for further study need to be addressed within a precise time period and by various mechanisms, depending on the nature of the task,

Decides to establish an *ad hoc* Study Group on IOC Development, Operations, Structure and Statutes under the Chairmanship of the past Chairman of the Commission, with the Terms of Reference annexed hereto;

Decides that the *ad hoc* Study Group shall consist of 5-7 experts, acting in their personal capacity, with knowledge and experience in the operation and structure of the Commission, designated by the Chairman IOC in consultation with the Chairman of the *ad hoc* Study Group;

Decides further that the Chairman of the *ad hoc* Study Group may invite, when required, experts to assist on specific items;

Requests the *ad hoc* Study Group to prepare its final Report for submission to the Seventeenth Session of the Assembly, and to provide an interim report to the Twenty-fifth Session of the Executive Council, including any matters requiring the Executive Council's advice or decision;

Also decides that a meeting open to all Member States may be arranged immediately prior to the Twenty-fifth Session of the Executive Council to allow a preliminary exchange of views on the interim report of the *ad hoc* Study Group.

Annex to Resolution XVI-19

Terms of Reference of the *ad hoc* Study Group on IOC Development, Operations, Structure and Statutes

An *ad hoc* Study Group on IOC Development, Operations, Structure and Statutes, taking into account the work undertaken by the *ad hoc* Study Group on FURES and views expressed by the Sixteenth Session of the Assembly, shall undertake further study on the following subjects:

(i) Means to achieve the Commission's goals, as set forth in "The Intergovernmental Oceanographic Commission: A Strategy for the Future", including development of a comprehensive IOC Action Plan.

(ii) Further steps required to identify means to achieve implementation of the "Modalities of Support That Member States Could Provide to Ensure the Success of Activities Promoted and Coordinated by the IOC".

(iii) Recommended action to mobilize further financial support for the IOC Programmes, including increased commitment to the IOC Trust Fund.

(iv) The feasibility, in the longer-term, of an IOC Pledging System.

(v) The organization and scheduling of IOC meetings, taking into account the need to clarify and document reporting and decision functions within the entire spectrum of IOC subsidiary bodies.

(vi) The IOC Statutes and Rules of Procedure with a view to recommending adjustments to better reflect IOC practice, the functional autonomy of the Commission and its special status as a "competent international organization" under the UN Convention on the Law of the Sea (Study of the Statutes and Rules of Procedure should include special reference to Article 10).

(vii) All aspects having a bearing on "geographical distribution".

ANNEX III

ADDRESSES

A. Opening Address by Professor Ulf Lie, Chairman of the Intergovernmental Oceanographic Commission (IOC), on 7 March 1991

Assistant Director General for Science, Mr. Badran,
Distinguished Delegates,
Ladies and Gentlemen,

It is with particular pleasure I welcome you to the Sixteenth Session of the IOC Assembly, because it is my conviction that this Assembly will make decisions on a number of IOC programmes and activities which deal with the major international and environmental issues confronting humanity today. Those activities are related to protection of the marine environment and rational utilization of its resources, as well as to studies of the effects of major global changes, including climatic changes, on the oceans and coastal areas.

It is not possible for me in this short opening remark to dwell on all the activities and programmes of the Commission, but there are certain major developments which I feel I should call the Delegates' attention to already at this point, because they are central elements of the Agenda for this Assembly. This concerns particularly the role of IOC in the international developments with regard to problems related to global change, as well as important matters regarding strengthening the marine science capabilities in developing countries. Furthermore, in the intersessional period there have been interesting and important developments regarding the organization of marine sciences within UNESCO, particularly with regard to a further definition of the concept of functional autonomy for IOC within UNESCO.

The issues relating to global change are at the center of the international debate today, and states and organizations are involved in discussions of all the relevant aspects. It is an important reflection on the acceptance of the role of IOC in this picture that IOC was invited to co-sponsor in its own right the Second World Climate Conference which was held in Geneva in October-November last year. To be invited to a conference of this nature means more than sending a representative to participate in the discussion. It is expected that IOC also can show that it has the ability to make a substantial contribution to the follow-up of the conference. Through very substantial initiatives of the IOC Secretary and by the use of consultants, IOC was able to put forward the Global Ocean Observing System as a major IOC contribution. That these efforts were successful is reflected in the fact that scientific sessions of the Second World Climate Conference on the proposal to establish a Global Climate Observing System identified the IOC Global Ocean Observing System as an important element.

The Delegates will recall that the Fifteenth Assembly of IOC in its Resolution XV-4 decided to establish a global integrated ocean observing system, and the Twenty-third Session of the IOC Executive Council in its Resolution EC-XXIII.5 further elaborated on concrete measures as follow-up to the Assembly Resolution. Since then the IOC Secretariat has been very active in developing the system, as you have seen in the documentation you have received for the Sixteenth Assembly. The establishment of a Global Ocean Observing System is important because it gives IOC a definite role to play on the international stage, but also because IOC, if the efforts succeed, will become operational on a scale which is new to the Commission. It is therefore my conviction that decisions the Sixteenth Assembly will take on the further development of the Global Ocean Observing System are of particular importance for the Commission.

The United Nations Conference on Environment and Development (UNCED), scheduled for June 1992 in Brazil, is a major international conference which will strongly influence our efforts to bring about a sustainable development, thus contributing to the survival of the global environment. The Conference is an important follow-up of issues which the World Commission on Environment and Development in its report from 1987 put on the world political agenda, and both intergovernmental and non-governmental organizations are deeply involved in planning for a successful conference. IOC has a special responsibility to ensure that the oceanic and coastal environments and resources receive proper attention at UNCED. Therefore, the Twenty-third Session of the IOC Executive Council in its Resolution EC-XXIII.3 expressed the willingness of the Commission to participate in UNCED and to contribute to the preparation for the conference. On the basis of the resolution, the IOC Secretary has continued the IOC involvement in the preparation for UNCED, and Member States were informed, through a circular letter of October 1990, about the decisions of the first session of the Preparatory Committee for UNCED. The agenda and documentation for the Sixteenth Assembly show that IOC gives high priority to the preparations for UNCED and maintains close contact with the UNESCO co-ordinator for environment on these matters.

IOC has continued to give strong support to the development of marine sciences in developing countries through training activities and institution building. These activities were reviewed by the Fifth Session of the IOC Committee for Training, Education and Mutual Assistance in Marine Sciences (TEMA), which met here in UNESCO house last week, and the recommendations from that meeting will be presented to the Sixteenth Assembly for its consideration. These recommendations include the development of an Action Plan for TEMA, which represents an important component in the further evolution of the **UNESCO/IOC Comprehensive Plan for a Major Assistance Programme to Enhance the Marine Science Capabilities of Developing Countries.**

During the intersessional period an initiative has been taken at the highest levels to stimulate true partnership among nations in the efforts to protect the marine environment and to safeguard its resources. His Excellency, Dr. Mario Soares, President of Portugal, following discussions on this matter with Professor Federico Mayor, Director-General of UNESCO, announced to the Twenty-fifth General Conference of UNESCO in 1989, his intention to convene a high-level meeting of prominent international figures, well-known scientists and officials from major bilateral and multilateral funding agencies. The High-Level Meeting will attempt to work out a strategy of action and to muster the resources that will enable the world community to respond effectively to the challenge of reducing the existing gap between developing and industrial countries in the context of oceans. This initiative by President Soares and Professor Mayor, in his personal capacity, is of the highest relevance to the implementation of the objectives of the Comprehensive Plan for TEMA, and IOC has therefore been involved in developing the scientific input for the preparation as well as the follow-up of the high-level meeting.

IOC can perform its important functions in the global and regional programmes only if it has an efficient and sufficiently flexible Secretariat structure with the authority to take independent actions. IOC Member States have therefore continuously attempted to improve its modus operandi and to streamline its structure, particularly through the work of the **ad hoc Study Group on Measures to Ensure Adequate and Dependable Resources for the Commission's Programme and Work**, the so-called FURES group. The **functional autonomy** of IOC within UNESCO, as reflected in Article 1 of the IOC Statutes, provides the legal basis for the independent decision-taking and operations of IOC vis-à-vis UNESCO. The Twenty-third Session of the IOC Executive Council in March 1990 passed its Resolution EC-XXIII.9 on **The status of the IOC and its functional autonomy**, in which the Chairman of IOC was requested to discuss the position of IOC within UNESCO with the Director-General of UNESCO, with a view to giving effect to the Commission's functional autonomy.

I am pleased to report to you that the Director-General on a number of occasions has taken time off from his extremely busy schedule to meet with the IOC Secretary and myself to discuss concrete matters related to the concept of functional autonomy. On the basis of those discussions as well as on the relevant IOC Resolutions, the Director-General has made important decisions which to a considerable

degree have given effect to the Commissions functional autonomy and strengthened the marine science programmes of UNESCO.

An important decision in that context is the establishment of a single administrative structure for marine sciences in the UNESCO secretariat. The new structure is named the Office of the Intergovernmental Oceanographic Commission and marine science related issues with the acronym IOC/MRI, and the Secretary of IOC is Director of the new structure. In order to enable the Secretariat of IOC fully to exercise its functions in serving the Member States of IOC and UNESCO, the Director-General has delegated to the Secretary of IOC a number of functions incumbent upon the Director-General, and he has issued directives to the UNESCO administration regarding those decisions.

A consequence of the single marine science structure in UNESCO is that all the activities relating to oceanography/marine sciences in the UNESCO Approved Programme and Budget is under the authority of the Secretary of IOC, and as you will see in the documentation for this Session of the Assembly, a single programme on oceans for the biennium 1992-1993 has been elaborated for consideration by the IOC Assembly, the Executive Board and the General Conference of UNESCO.

It is my observation that IOC in the intersessional period has made major progress in development of ways and means for an effective execution of its programmes. This progress has been achieved through decisions of the Governing Bodies of IOC and the work of the FURES group, but I am convinced that a major factor has been the strong support the Director-General of UNESCO has given to the IOC proposals for giving effect to its functional autonomy. I will also take this opportunity to thank you, Mr. Badran, for your active and positive participation in these discussions between representatives of UNESCO and IOC.

Some of the important decisions IOC has to take must be enacted upon within a very short time-frame. The high-level meeting in Portugal is scheduled for September this year, and the UNCED conference comes in June next year. Decisions must be taken today, next year is too late. The Global Ocean Observing System will probably be fully developed only during the first decades of next century, but planning and development of the system must take place now. The efficiency and flexibility of operation of the IOC Secretariat has been greatly enhanced by the decisions of the Director-General of UNESCO in regard to the functional autonomy, but adequate financial resources remain an obstacle for effective programme execution. The Director-General of UNESCO has also in this regard demonstrated his concern for the marine science activities of UNESCO, by a special allocation of $500 000 to the IOC/MRI budget for the 1990-1991 biennium, as well as for the 1992-1993 biennium. Many IOC Member States have also contributed to the planning and execution of programmes by providing funds-in-trust, but Delegates to this Assembly will in several agenda items be confronted with the strong plea to improve the financial support of IOC programmes. Clearly, the lack of adequate funding has long been an issue for the IOC, and has resulted in the establishment of the ad hoc Study Group for FURES, but I feel that we may miss an historic opportunity for participation in shaping the future of the ocean environment and its resources if we do not succeed in mobilizing sufficient resources during the next few years.

I am looking forward to an inspiring and useful debate on all those important issues during the next weeks, and I trust that the concern and wisdom of the Delegates to the Sixteenth Session of the Assembly will lead to decisions which will be of major importance for the future of the Commission.

**B. Address by Mr. Federico Mayor,
Director-General,
United Nations Educational, Scientific and Cultural Organization (UNESCO),
to the Sixteenth Session of the IOC Assembly
on 13 March 1991**

Mr. Chairman,

First of all, I should like to confirm what Mr Badran has already said, on my behalf. I was in the middle of the ocean, but my thoughts were with you, even if I was not present at the opening of the Assembly. Before I proceed to a more formal presentation, I should like to tell you that, since last year, when I had the pleasure of addressing this Assembly, we have been able to clarify many things and to improve some others. I was particularly glad when, last year at the Second World Climate Conference, I saw that the oceans play a prominent role in all environmental issues, but particularly in climate change. Therefore, I think that this is why we must work together. We are facing the same challenges. You represent a very important part of the world community, with a very important role to play in this action, based on scientific rigour, to address one of the most important problems regarding which we shall be responsible to the generations to come. I will not spare any effort on behalf of UNESCO in all my consultations and contacts in the context of the United Nations, particularly in the meetings of the ACC. I will not spare efforts to propose ways in which we can work better and jointly in the future, in which we can co-ordinate our activities with other UN bodies and non-governmental and inter-governmental organizations, not only with a view to avoiding overlapping, but also in the ways in which we can work in a very synergistic way. To face these problems and to be efficient, in order to cope with these very important matters which we have to address together, the wish has been expressed formally in the UN General Assembly, on the initiative of four countries (USA, USSR, Japan and UK) that all the components of the UN system must try to work hand in hand with others, not only with the sister organizations of the system, but also with intergovernmental and non-governmental organizations and with those who represent the scientific and technological community, who are actually working on these matters around the world. The proposal I have just mentioned has received here in UNESCO a very direct and firm response and we are trying every day to do our best to work all together, because the magnitude of the challenge is so important. In all these efforts, I should like to make it very clear that IOC is for us very important and relevant. We are here to try to put efficiently into practice what you, the IOC Assembly, decide. It is up to the Governments that are the members of the organization to guide and to inspire our action. And it is up to us to put your decisions into practice as efficiently as possible.

Mr Chairman,

As you know, we have been meeting often and we have been guided and inspired by your directives and I think that we have made some progress in this respect.

Speaking more directly from my heart to all of you, I wish to stress our decision to place the oceans in a position that can allow you to contribute all together, especially now that we are approaching a conference - the United Nations Conference on Environment and Development - that could be extremely important not only for dealing with environmental and developmental issues, but also for the re-examination that will no doubt will take place in the United Nations system as a whole, as we approach the Fiftieth Anniversary of the creation of that system. There is a new context and there are new actors on the world stage. Let me emphasize very much this new development. This Conference will be extremely important for the UN system as a whole, not only because, perhaps, a better definition will emerge of what finally we should do to improve the conditions of life and the dignity of man, but also because the oceans will find, in environmental terms, as well as from the resource and from the social scientific points of view, the place they deserve.

Mr. Chairman,
Ladies and Gentlemen,

I am sorry that my absence on mission prevented me from attending your opening session, but I am glad that it has nonetheless proved possible for me to address the IOC Assembly for a second time. On the previous occasion, at your Fifteenth Session, in July 1989, I affirmed my strong interest in the IOC and my willingness to support its work and development with additional funding and staff. The allocation to the IOC in 1990-91 of $ 500 000 in addition to the budget approved by the General Conference at its Twenty-fifth Session, and the proposed allocation of an extra $ 500 000 to the IOC in the new C/5 document represent - I hope you will agree - promises kept. On the staffing front, it has not been possible to do everything that I had hoped. However, the commitment to transfer to UNESCO's regular programme the cost of five General Service posts previously borne by the IOC Trust Fund has been met, and a P-5 post has been duly upgraded to D-1.

The main event, though, in the recent life of the IOC has - I think you will agree - been the restructuring I have instituted over the last six months. This has resulted in the creation of a single administrative structure for marine sciences, services and related training, education and mutual assistance activities within the Secretariat. I refer to the Office of the Intergovernmental Oceanographic Commission and marine science related issues. At the same time, a unified, integrated programme has been drafted, covering the whole field of relevant activities. This is being submitted to you, to the Executive Board of UNESCO and to the General Conference, to be adjusted and improved, if necessary, at each stage. I have also issued directives concerning the delegation of authority to the Secretary IOC who is also the Director of the new Office.

These actions have been taken - as he will confirm - in full consultation with your Chairman, and in accordance with the wishes expressed by the Assembly and the Executive Council of IOC. Clearly, these actions also correspond to my own wishes and my philosophy of how UNESCO ought to work, just as they demonstrate my trust in the IOC and its Secretary. I believe that I can count on you to respond in a similar spirit by continuing to show me your trust and confidence.

Looking at the world about us today, there is no shortage of problems clamoring for our attention. The great issues of war and peace and the long march of the peoples of the world towards democracy loom particularly large at the present time. A related problem and threat is undoubtedly the increasing gap between the industrialized and the non-industrialized countries. The gap covers most aspects of human life, including science and technology, and it must be a primary task of the IOC to help to reduce it. I trust that all concerned will make use of the restructuring I have instituted to ensure maximum effectiveness of the IOC's programmes in training, education and mutual assistance through an optimum use of the human and financial resources now available in the combined administrative structure. I do not doubt, Mr. Chairman, that the Assembly will express its commitment to this end.

Dear Colleagues,

Another area of great concern today is the environment. The ocean and its resources form an important part of the basis of life on this planet: the Planet Ocean. I recall the Second World Climate Conference, to which I paid two visits, and the impressive performance of the IOC on that occasion, under the guidance of the Secretary IOC and with the help of excellent team work. As a result, you have entered a new phase in the development of the IOC. The IOC is now well placed to play a leading role - in co-operation, on an equal footing, with ICSU and the UN Specialized Agencies concerned - in ocean research and related observations, services and mutual assistance. This, however, requires as a condition that the Member States of the IOC be willing to shoulder their part of the responsibility. Functional autonomy carries with it an increased responsibility for living up to your own expectations and those of your partners. I am conscious that one of our major problems is that of fulfilling the expectations that we sometimes manage to create. In this connection, the IOC Assembly - no less than many other governing

bodies of UN organizations - has a duty to ensure that it weighs all the facts and possibilities and does not pass resolutions without reflecting sufficiently on their implications.

As I said before, we are currently preparing for the United Nations Conference on Environment and Development, to be held in Brazil in 1992. This must be a major joint undertaking, in which the United Nations system collaborates as a whole. I have, as you know, taken several steps to ensure a proper contribution and a strong presence by UNESCO. I am pleased to note that you have emphasized at an early stage the importance of this event, and that the Secretary IOC and his secretariat are actively involved in contributing to its preparations. The IOC has marked its presence in the arena. Please help ensure that this is properly reflected in your own national contributions and statements. Team work is a necessity if we are going to succeed in reversing the trend of an increasing gap between nations. A new paradigm of trust and attitudes and solidarity on a global scale is required. You can help achieve this through the IOC. The IOC is co-operating over a wide spectrum with many of the United Nations agencies, with UNEP and with regional bodies. The Secretariat, with its limited resources, certainly needs your very strong backing to succeed in these endeavours.

I am of course following very closely the developments in the IOC Secretariat and the office of the Intergovernmental Oceanographic Commission and marine science related issues. The Secretary IOC has accompanied me on some missions, to his own country for one, and I have the same full confidence in him as you expressed in your reaction to his presentation of intersessional work earlier in the Session.

In the presence of so many challenges, there is always a danger of dispersion of effort. However, I believe that what is required at the present time is a concentration of purpose and resources on the core problems. This, together with great stamina and resolve, is required if we are to achieve our goals. I myself am determined to focus the programmes of UNESCO and to concentrate attention on a few priority issues. This emphasis was reflected in the opening address of the Assistant Director-General for Science, Mr. Badran, and there is no need for me to develop the point. However, I must underline how difficult this is to achieve in an international organization such as UNESCO and urge you to make decisions and give directions to the Secretary of the IOC that will help him to identify priorities and forms of rationalization, and thus provide the basis for focussed programme implementation.

My concluding words must be to express the hope that this Assembly will be successful and will confirm the inauguration of a strengthened IOC, functionally autonomous within UNESCO but an integral part of the Organization for which I have ultimate executive responsibility, dedicated to the promotion of the common welfare through the sharing of that great intangible heritage of humanity - the living traditions of science, education, culture, democracy and peace.

My dear Colleagues, Mr. Chairman,

To end, I should like to confess to you that, for many years, as a biochemist, as a brain biochemist, I always had a particular admiration for the oceans, for the sea. I hope I was a better biochemist than poet, but even as an amateur poet, an important part of my work is devoted to the sea and this is because I feel very strongly that the sea holds the secret of the past. I also confess to you that my admiration for the sea is because I am completely sure, and I am glad to say this before this Assembly, that the sea holds, today, the secret of the future.

Thank you very much. Mr. Chairman.

C. Address by Mr. Adnan Badran, Assistant Director-General for Science, United Nations Educational, Scientific and Cultural Organization (UNESCO), to the Sixteenth Session of the IOC Assembly on 7 March 1991

Mr. Chairman,
Distinguished Delegates,
Ladies and Gentlemen,

On behalf of the Director-General of UNESCO, I am pleased to welcome you to UNESCO House for the Sixteenth Session of your Assembly. The Director-General will be here next week and will address you at a convenient time. He has asked me to convey to you his welcome to UNESCO House and his best wishes for a successful session.

I had the pleasure to address the session of the Executive Council of your Commission one year ago. Since that occasion, the world both outside and inside UNESCO, has been undergoing considerable change. We all are witnessing the adjustment of these changes on the international scene, also in the membership of your Commission. In UNESCO, the Director-General decided that for the next biennium (1992-1993), a *single* unified programme on oceanography/marine sciences should be elaborated by the Secretary IOC in collaboration with me and this is now before you for consideration. This programme, submitted as well to the UNESCO Executive Board in May and to the UNESCO General Conference in October this year, is placed under the authority of the Secretary IOC, within a single administrative structure under his responsibility as Director of the Office of the Intergovernmental Oceanographic Commission and marine science related issues (IOC/MRI).

The Director-General has also decided on several important programmatic matters. These include, in particular, focusing, concentration and decentralization. The focus is on Africa, women and the least developed countries. The concentration efforts imply that the Organization's limited budget should be concentrated, as far as possible, in the individual sectors on programmes concerning a few selected topics within sectors, programmes and sub-programmes. The decentralization implies that programme implementation shall be carried out as far as possible in the Member States and through the field offices. Likewise, project identification should be carried out in the field. In the Science Sector, including the IOC, we have met these criteria in our preparation of the draft 26C/5. Decentralization is a subject you will have to address more closely than has been the case so far. The concentration has been achieved in ocean observations and on climate, coastal zone and training.

Certainly, in the debate of Commission III (tentatively scheduled for 28 to 31 October 1991) during the forthcoming 26th UNESCO General Conference, the single programme on oceanography/marine science will finally be considered as regards UNESCO's regular programme component of the activities of your Commission. The commitment by the Member States of IOC to assist in the spirit of partnership in the implementation of your global and regional programmes, in particular the World Ocean Circulation Experiment (WOCE), as the largest experiment in the field of geophysical fluid dynamics, will facilitate the promised special additional allocation to the IOC during the next biennium 1992-1993. This support will also be used for programme implementation and to strengthen the IOC Secretariat staffing in response to the building up of a continuous global ocean observing system (GOOS), using the momentum gained during the implementation of the Tropical Ocean and Global Atmosphere (TOGA) programme. Many issues that are addressed during your Assembly are closely linked with agenda items under consideration in the United Nations General Assembly, including drift-net fishing, Antarctica, and the Law of the Sea, and, in particular, the preparation for the 1992 United Nations Conference on Environment and Development (UNCED) in Brazil.

Mr Chairman, I wish you a most successful and rewarding session.

ANNEX IV

MEMBER STATES OF THE COMMISSION AND ITS OFFICERS

A. List of Member States of the Commission (117)
(as of 23 March 1991)

AFGHANISTAN
* ALGERIA
ANGOLA
* ARGENTINA
* AUSTRALIA
AUSTRIA
BAHAMAS (The)
BANGLADESH
BARBADOS
BELGIUM
BENIN
* BRAZIL
BULGARIA
CAMEROON
* CANADA
CAPE VERDE
* CHILE
* CHINA
* COLOMBIA
CONGO (The)
* COSTA RICA
COTE D'IVOIRE
CUBA
CYPRUS
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
DENMARK
DOMINICAN REPUBLIC (The)
ECUADOR
* EGYPT
ETHIOPIA
FIJI
* FINLAND
* FRANCE
GABON
GAMBIA
* GERMANY
GHANA
* GREECE
GUATEMALA
* GUINEA
GUINEA-BISSAU
GUYANA
HAITI
ICELAND
* INDIA
* INDONESIA
* IRAN, ISLAMIC REPUBLIC OF
IRAQ
IRELAND
ISRAEL
ITALY
JAMAICA
* JAPAN
JORDAN
* KENYA
KUWAIT
LEBANON
LIBYAN ARAB JAMAHIRIYA (The)
MADAGASCAR
* MALAYSIA
MALDIVES
MALTA
MAURITANIA
MAURITIUS
* MEXICO
MONACO
MOROCCO
MOZAMBIQUE
MYANMAR
NETHERLANDS (The)
NEW ZEALAND
NICARAGUA
* NIGERIA
NORWAY
OMAN
* PAKISTAN
PANAMA
PERU
* PHILIPPINES (The)
* POLAND
* PORTUGAL
QATAR
REPUBLIC OF KOREA (The)
REPUBLIC OF YEMEN
ROMANIA
SAMOA
SAUDI ARABIA
SENEGAL
SEYCHELLES
SIERRA LEONE
SINGAPORE
SOLOMON ISLANDS
SOMALIA
SOUTH AFRICA (Suspended)
* SPAIN
SRI LANKA
SUDAN (The)
SURINAM
SWEDEN
SWITZERLAND
SYRIAN ARAB REPUBLIC (The)
THAILAND
TOGO
TONGA
TRINIDAD & TOBAGO
TUNISIA
* TURKEY
* UKRAINIAN SOVIET SOCIALIST REPUBLIC (The)
* UNION OF SOVIET SOCIALIST REPUBLICS (The)
UNITED ARAB EMIRATES
* UNITED KINGDOM OF GREAT BRITAIN & NORTHERN IRELAND (The)
UNITED REPUBLIC OF TANZANIA (The)
* UNITED STATES OF AMERICA (The)
URUGUAY
* VENEZUELA
VIETNAM
YUGOSLAVIA

* MEMBERS OF THE EXECUTIVE COUNCIL

B. Officers of the Commission
(as at 23 March 1991)

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ANNEX V

BRUUN MEMORIAL LECTURES 1991

Thursday, 7 March 1991

(A B S T R A C T S)

MODELLING AND PREDICTION IN MARINE SCIENCE
(Chairman: Prof. M. Murillo, First Vice-Chairman IOC)

Christopher N.K. Mooers (USA)	Overview of the Coastal Ocean Prediction Systems Programme
Egil Sakshaug (Norway)	The Barents Sea/The Physical-Biological Connection
Chao Jiping (China)	The Real-Time Numerical Forecasting System for Marine Environmental Elements in China

OVERVIEW OF THE COASTAL OCEAN PREDICTION SYSTEMS PROGRAMME

by

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The Coastal Ocean Prediction Systems (COPS) Programme proposes to conduct the focused research and development necessary to produce, within a decade, the first-generation operational prediction system for the coastal ocean. (The term "coastal ocean" means here the EEZ, estuaries, and great lakes; the term "prediction" is used in the broad sense of simulation, hindcast, nowcast and forecast.) COPS is based upon societal need and scientific and technological opportunities. The societal need is to understand, monitor, model, and manage the coastal ocean every more comprehensively as the coastal ocean becomes more impacted by climate and global change, local and regional pollution, and humankind's intensifying multiple uses. The scientific and descriptive and dynamical understanding, electronic sensors, autonomous observing systems, remote sensing technologies, numerical circulation models, data assimilation methodologies, real-time telemetry, telecommunications and supercomputers. Analogous to what the national weather services of the world provide for atmospheric conditions and activities, the operational manifestations of COPS are envisioned to provide a capability for simulating, reconstructing, tracking and anticipating the synoptic evolution of coastal ocean circulation, stratification and so forth.

The initial stages of COPS would be largely focused on the physical aspects of the coastal ocean to meet several practical needs, and to provide a foundation for water quality, ecosystem, and sediment transport prediction systems. There is, however, an intellectual commitment to work with the chemical, biological and geological disciplines, from the outset if possible, to foster the development of real-time observing systems and numerical models in their provinces which can be linked to physical counterparts.

The societal needs for, present technical status of, research and development requirements of, and needed partnerships for COPS will be discussed, as well as its potential relationship to the Global Ocean Observing System (GOOS). For example, quantitative evaluations of observing and modelling systems are needed, as well as a series of prediction experiments performed using working prototypes.

THE BARENTS SEA/ THE PHYSICAL-BIOLOGICAL CONNECTION

by

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The Barents Sea is a shelf sea of average depth 230 m and area of 1,4 million km^2 north of 76°N it is characterized by low-salinity arctic surface waters; waters of the southern half are Atlantic. The southwestern part is permanently ice-free, while the remaining part is seasonally covered by ice -multiyear ice is scarce. The Barents sea is known for its large stocks of commercially important fish (capelin, cod),

seals and seabirds. Yet winter concentrations of plant nutrients which support the Barents Sea ecosystem are only 1/2 and 1/3 of those in the Bering Sea and the Antarctic Ocean, respectively; i.e. the same as in the Northeast Atlantic in general.

Being a polar sea exposed to large annual fluctuations in ice cover, climate and temperature of inflowing atlantic water, the Barents Sea is characterized rather by dramatic fluctuations in standing stocks of commercially important species than by "ecological" balance. This has been particularly true for the capelin, seal and bird stocks in the last five years.

The northern half of the Barent Sea is characterized by a spring bloom which takes place at the ice edge as soon as the ice starts to melt. This bloom follows the retreating ice edge and occurs, in principle, later the far north. Because of a marked pycnocline which persists until late autumn, the remaining part of the growth season is characterized by oligotrophy. Thus zooplankton are given one big but short-lasting meal per year, and annual primary production is low, maximum 50 g C m^{-2} y^{-2}. In the southern half the pycnocline can be deeper, thus causing a more durable bloom. The depth of mixing in the southern part of the Barents Sea is highly influenced by weather patterns; thus "new" nutrients are more or less regularly supplied after the spring bloom. Mathematical models indicate an annual production of 80-100 g C m^{-2} y-1. Primary production is thus strongly coupled to weather patterns. Presumably wind-forced deep mixing alternating with calm weather such as caused by regular passage of atmospheric low pressures optimize conditions for phytoplankton production.

THE REAL-TIME NUMERICAL FORECASTING SYSTEM FOR MARINE ENVIRONMENTAL ELEMENTS IN CHINA

by

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National Research Center for Marine Environment Forecast
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China

Like other countries along the ocean coast in the world, China is being challenged by the damages caused by severe oceanic events, such as storm surges, severe waves and sea ice. It is therefore of primary significance in China to investigate marine modelling of various time-scales and to improve the method of short-time scale prediction in recent years. A numerical prediction system including a method for decoding GTS data, objective analysis, atmospheric models combined with boundary layer model, storm surge models and sea wave model, has been established since January 1989.

Now, the predictors can receive reference from our numerical modelling products for doing the routine forecasting. Some numerical forecast products, such as sea ice during the winter season, are being directly issued to users.

The sea wave of the WAM model has been introduced into this system and connected with drive by seasurface wind given by a five-level atmospheric model for forecasting the sea waves in the area from 15 N to 45 N and from 105 E to 155 E.

A two-dimensional and non-linear storm surge model has been used for modelling surges along the coast of China. Also a moving nested barotropic atmosphere model and an analogy scheme have been adopted to forecast the track and the moving speed of typhoons. The sea surface pressure and stress fields are calculated based on the structure of the idealized typhoon field. The predictions of surge elevations and

depth-averaged currents in the areas of the China Sea are obtained by using the storm surge model with these fields. A new baroclinic typhoon prediction model has been developed and will be connected with the storm surge model. The above tide-level atmospheric model with a boundary layer model is also connected with surge model to forecast the water elevations and currents caused by cold-wave and/or extratropical cyclones during the spring and winter seasons.

The detail structure of our models and the results of forecasting will be introduced by a report.

ANNEX VI

SUMMARY OF THE STATEMENT BY THE DELEGATE OF KUWAIT ON AGENDA ITEM 8.3.6 "COLLABORATION WITH ROPME"

Mr. Chairman,

I present my sincere thanks and gratitude for your efforts and excellent management of our meeting. I also thank the members of your Bureau and Dr. Kullenberg, the Secretary of IOC and commend him for his efforts and the efforts of the Secreteriat in managing the IOC activities and the excellent preparation for this meeting. I also take this opportunity to present my congratulations to the new Chairman, Dr. Murillo, and the members of his Bureau, wishing them every success.

Mr. Chairman,

My country, Kuwait, is liberated. Thanks to God Almighty and to the efforts of the United Nations and its support for our just cause. The liberation of Kuwait became a reality as a result of sacrifices of the Kuwaiti people and those of the brotherly and friendly States. In this regard, allow me Sir, to express the thanks and gratitude of the Kuwaiti people to all who contributed to the liberation of Kuwait. I also reaffirm, on behalf of the Kuwaiti Government and people, our strong belief in the importance of the world system under the umbrella of the United Nations. Kuwait gives great priority to the role of the UN agencies and programmes which are dedicated to serving humanity and to creating a better living on this planet.

Based on this principle, my country is honoured to be an active member of IOC and to participate in its meetings and programmes.

Mr. Chairman,

Complete and serious damage is caused to the desert, marine and atmospheric ecosystems as a result of the Iraqi invasion and occupation of Kuwait.

In the Kuwaiti desert, great damage is caused to this already fragile ecosystem. Prior to the Iraqi invasion, Kuwait was very proud of its recently established protected desert ecosystems. Great efforts were exerted in desert greening programmes in order to prevent desertification and to protect the natural grazing areas and the desert ecosystem.

The magnanimous oil spill forms a great threat to the fisheries and coastal areas which are unique to the region such as the muddy and sandy shores, the mangrove ecosystems and the shallow areas which are rich in sea grasses and which are important feeding areas for the dugong, a rare and threatened species. Indeed, the spawning and reproductive areas of fish, shrimp and turtles are already destroyed. In addition, the rare corals in the region have been damaged. You have all seen the pathetic way in which sea birds are affected by this environmental crisis.

This environmental disaster has taken place in one of the world's most polluted marine areas. According to one of the studies, oil pollution in this region is estimated to be fifty times higher than in other similar marine environments.

Mr. Chairman,

The amount of oil burning in about 600 wells is estimated at six million barrels per day. Combustion of such huge amounts of oil creates the largest air pollution. The sky in Kuwait and

neighbouring countries is polluted with heavy clouds of smoke. As you may know, such a major pollution is not restricted to a certain region and will have drastic effects on public health, particularly for the sick, the elderly and the children.

The available studies indicate that 3-6% of the burning oil will be converted into smoke. This means that approximately 500,000 tons of smoke will be generated monthly. Furthermore, the burning oil wells add 5% of the world inputs of carbon dioxide. In addition, there are grave dangers from the huge amounts of carbon monoxide, sulfur dioxide and nitrogenous oxides. While the industrial nations are suffering from acid rain, Kuwait and the neighbouring countries will suffer from black rain and black dust for a long time. You are aware about the effects of such fires on the marine environment, both on a short- and long-term basis which pose an additional hazard for the people of the region.

In addition to suffering from heavy pollution by oil, the Kuwaiti waters also suffer from other pollutants which are equally dangerous on the environment and public health as a result of the Iraqi occupation. During the Iraqi occupation of Kuwait, large quantities of biological and industrial pollutants were introduced into the sea as a result of broken down sewage treatment systems and lack of maintenance for refineries and industrial facilities. To this should be added the pollution threats of sunken military and commercial ships and destruction of oil, military and civilian coastal installations as a result of military activities.

Mr. Chairman,

Kuwait, which was considered as one of the most advanced countries in the region for scientific research in general and oceanographic and marine sciences in particular, finds itself helpless and unable to effectively contribute in combatting this pollution and studying its harmful effects. This is because the foundations and the infrastructure of scientific research in Kuwait have been destroyed. In particular, the damage was greatest at the Kuwait Institute for Scientific Research, Kuwait University and the Environmental Protection Department. Additionally, the oceanographic research vessels are destroyed, including the largest and most modern research vessel in the region.

Mr. Chairman,

We have brought our problem to you due to the respect we hold for this prestigious body, a United Nations Commission made up of distinguished scientists in oceanography and marine sciences. We are certain that you will take a leading role in dealing with this crisis and in presenting urgent assistance to Kuwait which is harmed in a major way from this environmental disaster. Kuwait will specially welcome help for re-establishing the oceanographic and marine research infrastructure, such as providing our libraries with scientific books and references and results of scientific research of relevance to the existing problem. Also, we ask your assistance in re-establishing and re-equipping the damaged laboratories, as well as providing experts to assist in planning and implementation of necessary scientific programmes to assess the environmental damage to the marine ecosystem.

Kuwait is prepared to welcome IOC experts and to effectively participate in any programme which you might agree upon. We shall support such programme with all the available means.

Mr. Chairman,

It is a horrifying event and an historic moment that requires from us a daring and effective decision.

Thank you, Mr. Chairman.

ANNEX VII

THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION: A STRATEGY FOR THE FUTURE

The Intergovernmental Oceanographic Commission (IOC) was founded in 1960 with the recognition that "the oceans, covering some seventy percent of the Earth's surface, exert a profound influence on mankind and indeed upon all forms of life on the Earth. ... In order properly to interpret the full value of the oceans to mankind, they must be studied from many points of view. While pioneering research and new ideas usually come from individuals and small groups, many aspects of oceanic investigations present far too formidable a task to be undertaken by any one nation or even a few nations." [1]

These prophetic thoughts have been given new meaning with the recognition that the Earth and its environment are changing dramatically on previously unanticipated time and spatial scales at a time when many nations are seeking new opportunities for social and economic development. The international community is taking unprecedented actions to address the economic and social implications of global environmental change and of sustainable development which as a result have become central to the agenda of international affairs.

Since the oceans are central to both global environmental change and sustainable development, it is essential that we understand and are able to predict global and regional ocean processes and their interaction with the atmosphere, biosphere and geosphere. However, our scientific knowledge of these processes is limited. As a consequence we cannot predict, with acceptable accuracy, the behaviour of a most important part of the global system, the oceans, and their impact on the environment.

It is therefore essential that we expand this knowledge and improve this capability through a renewed commitment to oceanographic research, technology development and transfer, and education and training. The Intergovernmental Oceanographic Commission has the potential to play a pivotal role in meeting these needs. In order to do so, the Commission has articulated a clear strategy for its future, and most immediately for the 1990s.

THE COMMISSION'S PRINCIPAL GOAL AND MAJOR THEMES

The principal goal which has guided the Commission in developing this strategy is simply stated in its Statutes as follows:

> The IOC is committed to providing the intergovernmental framework "to promote marine scientific investigations and related ocean services, with a view to learning more about the nature and resources of the oceans."

To achieve this overarching goal and to address the challenges it poses, the Commission will continue to strengthen its international marine science programmes and ensure that it is able to fulfil its role as the competent international organization within the United Nations system "to promote marine scientific investigations."

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[1] The Intergovernmental Conference on Oceanographic Research, Copenhagen, 11-16 July 1960 (Unesco document NS/167).

To meet these challenges, the Commission will focus on four major themes which will:

(i) Develop, promote and facilitate international oceanographic research programmes to improve our understanding of critical global and regional ocean processes and their relationship to the stewardship of ocean resources and their exploitation;

(ii) Ensure effective planning for the establishment, and subsequently the co-ordination, of an operational global ocean observing system which will provide the information needed for oceanic and atmospheric forecasting, and for ocean management by coastal nations, and also serve the needs of international global environmental change research.

(iii) Provide international leadership for the development of education and training programmes and technical assistance essential to global ocean monitoring and associated oceanographic research; and

(iv) Ensure that ocean data and information obtained through research, observation and monitoring are efficiently husbanded and made widely available.

The Commission will ensure that its major programmes support, where appropriate, intergovernmental policy development and effective action by:

(i) Encouraging the United Nations and its agencies and programmes to identify for action by the IOC their needs for global marine scientific investigation;

(ii) Responding to Member States' needs which derive from United Nations actions related to the UN Convention on the Law of the Sea, and the expected relevant decisions of the UN Conference on Environment and Development;

(iii) Encouraging Member States similarly to identify for action by the IOC their needs for regional marine scientific investigation through the IOC's regional Sub-Commissions and Committees; and

(iv) Arranging for the results of IOC programmes to be transmitted effectively to the United Nations and its agencies and programmes.

DEVELOPMENT OF NATIONAL CAPABILITIES:

The development of national capabilities for marine sciences and services through worldwide partnership of its Member States and their scientific institutions and national organizations is one of the major themes of IOC. The commitment to Training, Education and Mutual Assistance in the marine sciences (TEMA) is intimately interwoven with other objectives of the Commission, including the fashioning of oceanographic research programmes and the development of global and regional networks of ocean services.

Until recently, the formation of national capabilities for marine sciences and services was seen primarily as part of the overall socio-economic as well as cultural development of individual countries or groups of countries in a given region. This is still the main immediate goal since it is linked to the national use and management of the resources and amenities of the waters adjacent to each country. However, the developing global partnership in response to the global problems of climate change and sea level rise adds a new dimension to TEMA. It has become of increased interest to all countries to develop ocean research and monitoring into a truly global and mutually supportive activity.

The Commission's strategy with regard to TEMA relies on partnership between its Member States. The IOC acts as a catalyst to stimulate, co-ordinate, and harmonize a broad range of TEMA activities within the priorities of the strategy.

Training, education, and mutual assistance have to be an integrated, important part of any major regional and global programme in marine science including the pooling and strengthening of research and training capacities within each of the major regions, but also by further encouraging bilateral training and assistance programmes. Advice has also to be given to other international agencies on how to support the development of marine science capabilities in their Member States through the 'UNESCO-IOC Comprehensive Plan for a Major Assistance Programme to Enhance the Marine Science Capabilities of Developing Countries'.

Member States proposing and planning such programmes must be prepared to make a commitment to TEMA activities within these programmes; they should take a lead in building up networks for specialized training and for developing the necessary infrastructure on a national and regional level. In cases where there are insufficient basic scientific and technical personnel and equipment to build on, ways and means have to be found to create such a base.

BALANCING NEEDS AND RESOURCES

In order to address successfully the ever-increasing needs before it, the Commission will develop programmes and activities which carefully balance the needs of its Member States with the resources Member States provide. To this end the IOC will:

Establish a framework which will, when implemented, guide the allocation of the Commission's financial and staff resources and, further, will provide guidance to Member States on the specific needs of IOC programmes and activities.

This framework will be based on a set of guidelines and procedures through which the IOC will be able periodically to review and establish priorities which will guide the Commission's allocation of financial and human resources.

In addressing these priorities, there will be instances when a programme or activity is perceived as being of the highest importance, but for which normal resources available within the Commission are inadequate. In such cases the Commission will, as the competent organization within the United Nations system for marine scientific research and ocean services, generate the substantial extrabudgetary resources required from Member States, through the United Nations system and/or from other sources.

ANNEX VIII

MODALITIES OF SUPPORT THAT MEMBER STATES COULD PROVIDE TO ENSURE THE SUCCESS OF ACTIVITIES PROMOTED AND COORDINATED BY THE IOC

1) Improving and establishing, when required, proper liaison mechanisms and adequate national coordinating structures and counterpart arrangements for marine science activities, in general, and for the purposes of IOC coordination, in particular. In this context, the importance of rapid communication through electronic mail and/or tele fax links is underlined.

2) Increasing awareness about the existence of IOC, its objectives, and the nature of its programmes.

3) Responding in due time to the requests of the IOC in regards to the inventories of research institutions and marine scientists.

4) Incorporation of relevant IOC ocean science, ocean services and related activities, in bilateral agreements signed by Member States.

5) Facilitation of the work of research vessels carrying out scientific and/or training activities under the coordination of the IOC.

6) Exchanging data and information relevant to the IOC Programme of Work.

7) Acknowledging in publications and reports, the support received from the Commission.

   This should also be done in relation to scientific and operational activities. For this purpose a "code of practice" should be prepared by the IOC Secretariat.

8) Provision of in kind contributions pertinent to the IOC scientific programme, ocean services and TEMA activities, to complement allocations made by the IOC. This modality could include hosting of scientific and technical meetings; provision conference services; and supporting domestic travel.

9) Allocation of funds (per diem and international travel) to facilitate the participation of national representatives and experts in scientific and technical meetings organized by the IOC.

10) Allocation of ship time and access to specialized equipment for the execution of the IOC ocean science, ocean services and related programmes.

11) Transferring of equipment, through the IOC Voluntary Co-operation Programme (VCP), from technologically advanced to developing Member States. When possible, this transfer should take place through the IOC regional bodies, and should, as a requisite, be used in ongoing marine research and monitoring activities.

12) Supporting training courses, seminars, workshops and other activities coordinated by IOC.

   When Member State offer or accept hosting IOC activities, they should ideally be aware of the financial implications involved. It seems appropriate to draw out a "code of conduct" regarding the implications of offering to host IOC activities.

13) Making obligatory and voluntary financial contributions in support of the IOC Programme of Work.

14) Secondment of personnel and provision of associate experts to the IOC Secretariat.

15) Selecting Member States to function as "lead states" for specific activities coordinated by the IOC. This mechanism could be an effective way of decentralization, as it has been often suggested by the regional bodies.

16) Allocating funds to prepare and publish series of informative documents (brochures, updated versions of the IOC Manual, expanded versions of the biennial report of the Commission, and other pertinent documents). Such materials should be widely distributed to Member States and appropriate international organizations.

ANNEX IX /ANNEXE IX /ANEXO IX /ПРИЛОЖЕНИЕ IX
الملحق السابع, IX

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ANNEX X

LIST OF WORKING DOCUMENTS

Document Code	Title
IOC-XVI/1	Agenda
IOC-XVI/1 Add.	Revised Timetable
IOC-XVI/2	Annotated Provisional Agenda
IOC-XVI/3	Summary Report published in the UNESCO Main Series Documents as SC/MD/97 (this Document)
IOC-XVI/4	List of Documents
IOC-XVI/5	List of Participants
IOC-XVI/6	Report of the Secretary on Intersessional Activities
IOC-XVI/6 Suppl.	List of Circular Letters, IOC Meetings, Meetings at which IOC was represented, IOC Information Documents
IOC-XVI/7 Pt.I and Pt.II	Status Report on the IOC Programme and Budget
IOC-XVI/8	Action Paper
IOC-XVI/8 Annex 1	Proposed Programme on Coastal Ocean Circulation Dynamics and Fluxes
IOC-XVI/8 Annex 2	Draft Action Plan for the GIPME Programme
IOC-XVI/8 Annex 3	Toward a Global Ocean Observing System: a Strategy
IOC-XVI/8 Annex 4	Proposal for a Long-term Monitoring System of Coastal and Near-shore Phenomena Related to Global Climate Changes
IOC-XVI/8 Annex 5	Project Plan for the Global Temperature Salinity Pilot Project (GSTPP)
IOC-XVI/8 Annex 6	Proposal for a Draft Action Plan for Training, Education and Mutual Assistance in the Marine Sciences (Replaced by Documents IOC/TEMA-V/9 rev.2 + Add.)

IOC-XVI/8 Annex 7	Status Report on IOC Involvement in the Preparation of the 1992 United Nations Conference on Environment and Development (UNCED)
IOC-XVI/8 Annex 8	Proposal on the Draft Programme and Budget for 1992-1993
IOC-XVI/8 Annex 9	Proposal for a Global Climate Observing System (GCOS)
IOC-XVI/9	Draft Biennial Report of the Commission, 1989-1990

NB. This list is for reference only. No stocks of these documents are maintained, except for the Summary Report.

ANNEX XI

LIST OF ACRONYMS

ACC	Administrative Committee on Co-ordination
ACMRR	Advisory Committee of Experts on Marine Resources Research (FAO)
ACP	African, Caribbean and Pacific Group of States (ACP Group)
ADCP	Acoustic Doppler Current Profile
ASFA	Aquatic Sciences and Fisheries Abstracts (FAO-IOC-UN)
CCAMLR	Commission for the Conservation of Antartic 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
CD-ROM	Compact Disk with a Read-only Memory
CEC	Commission of the European Communities
CEOS	Committee on Earth Observation Satellites
CEP POL	Marine Pollution Assessment and Control Programme for the Wider Caribbean (IOC-UNEP)
CERESCOR	Centre de recherche scientifique de Conakry
CGMW	Commission for the Geological Map of the World
CGOM	Consultative Group on Ocean Mapping (IOC)
CLICOM	Climate Computer
COARE	Coupled Ocean-Atmosphere Response Experiment (TOGA-COARE)
COMEMIR	Continental Margin Environments and Mineral Resources
COPS	Coastal Ocean Prediction Systems
CPPS	Permanent Commission for the South Pacific
DBCP	Drifting Buoy Co-operation Panel
DIS	Data and Information Systems (IGBP)

ECOR	Engineering Committee on Oceanic Resources
EEC	European Economic Community
EEZ	Exclusive Economic Zone
EQUARIDGE	International Study of the Equatorial Segment of the Mid-Atlantic Ridge
ERFEN	Estudio Regional del Fenómeno 'El Niño'
ESA	European Space Agency
FAO	Food and Agriculture Organization of the United Nations
FURES	*Ad hoc* Study Group on Measures to Ensure Adequate and Dependable Resources for the Commission's Programme of Work
GAPA	International Geological/Geophysical Atlases of the Atlantic and Pacific Oceans (CGOM)
GCOS	Global Climate Observing System
GEBCO	General Bathymetric Chart of the Oceans (IOC-IHO)
GEEP	Group of Experts on Effects of Pollutants (IOC-IMO-UNEP)
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)
GFCM	General Fisheries Council for the Mediterranean (FAO)
GIPME	Global Investigation of Pollution in the Marine Environment (IOC)
GLOSS	Global Sea-Level Observing System (IOC)
GOOS	Global Ocean Observing System
GTS	Global Telecommunication System (WMO)
GTSPP	Global Temperature-Salinity Pilot Project
IAEA	International Atomic Energy Agency
IBCCA	International Bathymetric Chart of the Caribbean Sea and Gulf of Mexico (CGOM)
IBCEA	International Bathymetric Chart of the Central Eastern Atlantic (CGOM)

IBCM	International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series (CGOM)
IBCWIO	International Bathymetric Chart of the Western Indian Ocean (CGOM)
IBCWP	International Bathymetric Chart of the Western Pacific Ocean (CGOM)
ICES	International Council for the Exploration of the Sea
ICSEM	International Commission for the Scientific Exploration of the Mediterranean Sea
ICG	International Co-ordination Group
ICOD	International Centre for Ocean Development (Canada)
ICSPRO	Inter-secretariat Committee on Scientific Programmes Relating to Oceanography
ICSU	International Council of Scientific Unions
IDNDR	International Decade for Natural Disaster Reduction
IDOE	International Decade of Ocean Exploration (IOC)
IGBP	International Geosphere-Biosphere Programme (ICSU)
IGOSS	Integrated Global Ocean Services System (IOC-WMO)
IHO	International Hydrographic Organization
ILMR	International Laboratory of Marine Radioactivity (IAEA)
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCARIBE	IOC Sub-Commission for the Caribbean and Adjacent Regions
IOCEA	IOC Regional Committee for the Central Eastern Atlantic
IOCINCWIO	IOC Regional Committee for the Co-operative Investigations in the North and Central Western Indian Ocean
IOCINDIO	IOC Regional Committee for the Central Indian Ocean
IOCSOC	IOC Regional Committee for the Southern Ocean
IODE	International Oceanographic Data and Information Exchange (IOC)
IOI	International Ocean Institute (Malta)
IOMAC	Indian Ocean Marine Affairs Co-operation
IPCC	Intergovernmental Panel on Climate Change (UNEP-WMO)

IPO	International Planning Office (WOCE)
ITSU	International Tsunami Warning System in the Pacific
IWP	Intergovernmental WOCE Panel
JGOFS	Joint Global Ocean Flux Study (SCOR-IOC)
JSC	Joint Scientific Committee (ICSU-WMO)
KMFRI	Kenya Marine and Fisheries Research Institute
LEPOR	Long-term and Expanded Programme of Oceanic Exploration and Research
LOICZ	Land-Ocean Interaction in the Coastal Zone
MAP	Margins of Active Plates
MARPOLMON	Marine Pollution Monitoring System (IOC)
MAST	Marine Science and Technology (CEC)
MIM	Marine Information Management
MSCP	Marine Science Country Profile
NASA	National Aeronautics and Space Administration (USA)
NERC	Natural Environment Research Council (UK)
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	National Oceanographic Data Centre (IODE)
NOP	National Oceanographic Programme (IODE)
NUTIS	NERC Unit of Thematic Information Services
OALOS	Office for Ocean Affairs and the Law of the Sea (UN)
OCDW	Ocean Climate Data Workshop
OCEAN-PC	Ocean Personal Computer Project
ODAS	Ocean Data Acquisition Systems, Aids and Devices
ODP	Ocean Drilling Programme
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))
PAGES	Pilot Programme on Past Global Changes
PC	Personal Computer
PIANC	Permanent International Session of Navigation Congresses
PICES	North Pacific Marine Science Organization
POEM	Physical Oceanography of the Eastern Mediterranean
PREP	Penaied Prawns Recruitment Project
PRIMO	Programme de Recherche Internationale en Méditerranée Occidentale
PSMSL	Permanent Service for Mcan Sea-Level
RECOSCIX-WIO	Regional Co-operation for Scientific Information Exchange - Western Indian Ocean
RNODC	Responsible National Oceanographic Data Centre (IODE)
ROPME	Regional Organization for the Preservation of the Marine Environment
ROSTLAC	Regional Office for Science and Technology in Latin America and the Caribbean
ROV	Remotely Operated Vehicle
RV	Research Vessel
SAREC	Swedish Agency for Research Co-operation with Developing Countries
SARP	Sardine-Anchovy Recruitment Project (IREP)
SCAR	Scientific Committee on Antarctic Research (ICSU)
SCOR	Scientific Committee on Oceanic Research (ICSU)
SEATAR	Joint CCOP-IOC Working Group on post-IDOE Studies of East Asian Tectonics and Resources
SIDA	Swedish International Development Agency
SMLA	Soviet Maritime Law Association
SOA	State Oceanic Administration (Peoples' Republic of China)
SOAR	Satellite Ocean Analysis for Recruitment
SOC	Specialized Oceanographic Centre
SOPAC	South Pacific Applied Geoscience Commission

SSG	Scientific Steering Group
STAR	Joint SOPAC-IOC Working Group on South Pacific Tectonics and Resources
SWCC	Second World Climate Conference
TEMA	Training, Education and Mutual Assistance in Marine Sciences (IOC)
TOGA	Tropical Oceans and Global Atmosphere (WCRP)
T-S	Temperature-Salinity
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
UNGA	United Nations General Assembly
VCP	Voluntary Co-operation Programme
WAM	Wave Model
WCP	World Climate Programme
WCRP	World Climate Research Programme
WDC	World Data Centre
WESTPAC	IOC Sub-Commission for the Western Pacific
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WOW	World Ocean Watch
XBT	Expendable bathythermograph