Intergovernmental Oceanographic Commission
Reports of Governing and Major Subsidiary Bodies

IOC Committee for the Global Investigation of Pollution in the Marine Environment

Seventh Session

Paris, 21-25 January 1991

SC/91/CONF/213/COL/4

UNESCO

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1. OPENING

1 Dr. Neil Andersen, Chairman of the Committee on the Global Investigation of Pollution in the Marine Environment (GIPME), called the Session to order at 10.00 on 21 January 1991.

2 The Secretary IOC, Dr. Gunnar Kullenberg, welcomed the participants. He noted that while GIPME was initiated over twenty years ago and accelerated subsequent to the United Nations Conference on the Human Environment, Stockholm 1972, in response to its Recommendations 86 and 87 major field and methodological achievements had taken place in recent years.. The Programme has been advancing based on the work of three Groups of Experts: the Group of Experts on Methods, Standards and Intercalibration (GEMSI), also co-sponsored by UNEP; the Group of Experts on Effects of Pollutants (GEEP), also co-sponsored by UNEP and IMO; and the Group of Experts on Standards and Reference Materials (GESREM), also co-sponsored by IAEA and UNEP. Close co-operation exists among the Co-sponsoring Agencies, regional bodies and other organizations in implementing the Programme. A key aspect of the success and achievements of the Programme is the involvement of national experts from Member States and the Officers of the Programme and Committee, as well as the efforts of members of the Secretariat.

3 Monitoring methods and techniques have been developed, tested and agreed upon by the experts, approaches for control measures of pollution problems have been formulated and assessments have been completed. These are the results of the scientific programme.

4 Actions were taken through both global and regional activities. The latter have increased in recent years, both through co-operation with United Nations agencies, especially UNEP, and through the involvement of Member States. CEPPOL has now been launched in the Caribbean in co-operation with UNEP. Efforts concentrate on co-ordinating and making the best use of resources, both human and material, in the Member States.

5 There is an increased awareness of approaches that different Member States have taken. The Secretariat is reflecting on these different approaches of Member States on the United Nations Conference on Environment and Development (UNCED), and other major global and regional events. Interactions in the coastal zone are of increasing importance, as well as studies of the boundaries to the land and the open sea. The first field phase of the Open Ocean Baseline Study has been launched. In the make-up of sets of regional activities, pilot or fully fledged monitoring programmes have been launched. Data bases have been operated. However, this has now to be reassessed, and this session need to deal with the evolution of the MARPOLMON Programme. Data gathered have been used in GESAMP assessments and other regional assessments.

6 Considerable time has passed since GIPME-VI, one reason being that a large number of diverse activities were planned and required time to mature. The long-planned International Musselwatch has been launched. One objective of Musselwatch is to build up networks of laboratories. GEEP has progressed with biological effects techniques. These may be vital in assessing important pollution problems such as those sometimes related to aquaculture. Interactions with the Global Change Programme will be discussed and co-ordination of activities should be ensured.

7 As regards TEMA, a major venture has been launched together with IAEA for donated equipment being serviced and maintained at monitoring laboratories in developing countries. The Committee may advise on this and other activities how best to implement and raise the required resources.

8 In concluding, the Secretary IOC wished the participants a successful Session, and productive directives for the Secretariat.

9 The Chairman GIPME in his response to Dr. Kullenberg's welcome and opening address, noted that considerable progress had been achieved. It was necessary for the Committee to address UNCED and

to indicate its position on this major United Nations conference; it was also necessary 'imely for the Committee to consider what role GIPME should play in global climate change program . The Session was declared open.

2. ADMINISTRATIVE ARRANGEMENTS

2.1 ADOPTION OF THE AGENDA

10 The Committee adopted the Provisional Agenda of the Session (Document IOC/SC-GIPME-VII/1) with the following addition:

5.2.10 UNEP-IOC Action Plan for the Black Sea.

11 The Agenda is presented as Annex I of this report.

2.2 DESIGNATION OF RAPPORTEUR(S)

12 In response to an invitation to the Committee by the Chairman, the Delegate of Egypt, Dr. Hussein Badawi, volunteered to be the Rapporteur; the Committee welcomed this and designated Dr. Badawi as Rapporteur of the Seventh Session of GIPME.

2.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

13 The Technical Secretary for the Session, Dr. A. Boussoulengas, introduced the Provisional Timetable which met with the Committee's agreement. The Session would normally be conducted in Plenary, but ad hoc Sessional Drafting Groups could be established if required.

14 The Technical Secretary introduced the documentation, indicating the Agenda Item under which each document should be discussed. Several delegates and representatives of international organizations indicated that they would submit information documents.

3. GIPME SCIENTIFIC SYMPOSIA : A REASSESSMENT

15 The Chairman introduced this Item by recalling that at GIPME-VI a scientific symposium was convened prior to that meeting which addressed the status and trends in the development of the GIPME Programme. He pointed out that, in his opinion, the symposium was successful in that it brought together scientists from the regions involved in IOC Programmes who communicated, compared and discussed the implementations of their respective activities. He further recognized that the operational side of the GIPME Programmes are regionally oriented activities, each activity being identified under an umbrella designated as GIPME-MARPOLMON. He offered the view that it would seem that the most efficient, productive and pragmatic way to approach the convening of further symposia would be to convene such meetings in a region where another GIPME meeting, not necessarily the Scientific Committee, was also being convened. In this context he referred to the joint GEEP-GEMSI meeting (Moscow, 15-18 October 1990) with participants from several regions, also with GESREM represented, where a large part of the substantive programme had been reviewed. Several Delegations made interventions supporting this general view, specifically stating that it would be remiss on the part of GIPME not to continue such symposia, when appropriate. It was suggested that such symposia should serve as a "niche" in the area of marine environmental pollution monitoring, and not compete with other scientific meetings on marine environmental monitoring. The Committee endorsed these comments and The Committee adopted Recommendation GIPME-VII.1.

4. INTERSESSIONAL ACTIVITIES

16 The Technical Secretary introduced Document IOC/SC-GIPME-VII/6 "Report on Intersessional Activities in the Field of Marine Pollution Research and Monitoring".

17 The Secretary IOC noted that this document provided a brief description of activities during the four years since the Sixth Session of the Committee. More detailed information on intersessional activities was provided in the documents provided to the Session, including the reports of Groups of Experts, meetings, workshops, etc., and that had been distributed to the participants of the present Session.

18 The Technical Secretary noted that considerable progress had been achieved within the GIPME Groups of Experts: GEMSI, GEEP and GESREM. Several manuals were published, methods were developed, and numerous workshops, training courses and intercalibration exercises had been implemented.

19 He pointed out that two major developments had taken place during 1990; the implementation of the first phase of the long planned Open Ocean Baseline Study and the entering into an operational phase of the International Musselwatch.

20 Co-operation with UNEP, IAEA, IMO and other Agencies and organizations, such as ICES, has been increasing, contributing considerably to the strengthening of the Programme; co-operation with regional bodies and Member States had made possible the success of a multiplicity of regional activities.

21 The Chairman noted that Recommendations and the Action Plan adopted at the Sixth Session of the Committee have been successfully implemented and expressed his gratitude for the dedicated efforts of the Secretariat and participation of scientists from a large number of Member States, bearing in mind the limited resources available.

22 **The Committee took note** of these remarks and endorsed them.

23 **The Committee accepted** the report on intersessional activities.

24 **The Committee agreed** to deal with specific Agenda Items in the report of intersessional activities under the appropriate agenda items

5. GLOBAL INVESTIGATION OF POLLUTION IN THE MARINE ENVIRONMENT (GIPME) AND THE MARINE POLLUTION MONITORING SYSTEM (MARPOLMON)

5.1 GLOBAL ACTIVITIES

25 The Chairman introduced the global activities of GIPME noting that the Programme could be conceptually viewed as bi-modal, that is, regional activities being implemented under the umbrella of MARPOLMON, which, when taken, would comprise a global picture, and the other components of the Programme which constituted the research and global elements of the Programme. As examples of the latter, he identified the various training and intercomparison workshops being convened, and the implementation of the Open Ocean Baseline study. In this context, he suggested that to address this aspect of the Programme, it would seem to be desirable to establish two ad hoc sessional groups, one for reviewing MARPOLMON and one for completing the draft GIPME Action Plan, and to further identify specific elements required for implementation of the GIPME Programme, including resources required for the implementation and for identification of global activities to which emphasis would need to be given in the future. There being no comments to the contrary, the Chairman requested Dr. J.M. Bewers (Canada), and Dr. A. Knap (Chairman GEMSI) to take the responsibility of chairing the ad hoc groups on MARPOLMON and the GIPME Action Plan respectively.

5.2 REGIONAL ACTIVITIES

26 The Technical Secretary introduced Document IOC/SC-GIPME-VII/Inf.2 "Report on the Status of MARPOLMON and its requirements".

27 He noted that MARPOLMON has developed through the years to comprise regional activities including regional and national monitoring projects, data bases, training workshops etc. These activities are adjusted to the needs of the regions concerned. However, MARPOLMON is not a static but it is an evolving programme. The Open Ocean Baseline Study was a good example for a new data base which could also be part of MARPOLMON. It was timely to address the future interactions of MARPOLMON with climate change study programmes and coastal and oceans observing systems. He suggested that these amongst other issues, could be considered by the ad hoc group on MARPOLMON.

5.2.1 IOCARIBE

28 The Technical Secretary described the IOCARIBE marine pollution research and monitoring programme. He noted that CARIPOL, the regional component of MARPOLMON on monitoring petroleum hydrocarbons in the Caribbean region has continued. Phase I of the CARIPOL Programme has been extended to include marine debris. A pilot project for monitoring marine debris was initiated in 1990 and a data base is being established at the IOCARIBE Secretariat. Phase II - Monitoring of Petroleum Hydrocarbons in Sediments and Marine Organisms is being carried out by a number of regional institutions and the data base is being established with the assistance of NOAA, Washington.

29 The IOCARIBE Group of Experts on Marine Pollution Research and Monitoring met in Cartagena, Colombia, 14-16 May 1990 and reviewed the on-going CARIPOL Programme and considered the new IOC-UNEP/CEPPOL Programme.

30 The GIPME/MARPOLMON-CARIPOL Institutional network was formalized during 1990. This institutional network is intended to co-operate and provide scientific inputs to the development and consolidation of the Marine Pollution Assessment and Control Programme for the Wider Caribbean Region (CEPPOL) which is a Joint IOC-UNEP programme.

31 Dr. L. Mee, who acts also as Interim Co-ordinator for CEPPOL, outlined the development and achievements of this joint IOC-UNEP programme. CEPPOL consolidates and further develops in a single programme, existing elements of marine pollution monitoring developed within the CARIPOL programme, mechanisms for harmonizing natural policies and stimulating technology transfer (developed within UNEP's Carribbean Environmental Programme), support for research projects (from UNEP and IOCARIBE) as well as relevant regional activities of other international Agencies. The CEPPOL programme was formulated at the IOC-UNEP Regional Workshop to Review priorities for Marine Pollution Monitoring, Research, Control and Abatement in the Wider Caribbean in San Jose, Costa Rica 24-30 August 1989 (see IOC Workshop Report No 59). The programme is currently coordinated from the CEP regional coordinating office in Kingston, Jamaica and the individual project activities are jointly managed by project officers in Kingston and Cartagena.

32 CEPPOL formally commenced in August 1990. The wider Caribbean region includes 33 countries, and it is clear that an innovative strategy is required to identify and address their common environmental problems with the extremely limited financial resources available. The CEPPOL programme is initially focusing on seven inter-related project activities. These include a survey of land-based sources, pilot studies of pesticides, further development and application of the CARIPOL oil and marine debris monitoring network, assessment of sewage pollution, pilot studies of organotin contamination, of sensitive marine ecosystems (such as coral reefs), and formulation and application of environmental quality criteria and relevant standards. Each of these activities is action-oriented and will make specific recommendations to the governments of the region on the control and abatement of pollution

as well as relevant follow-up activities. All seven activities are currently underway. Some of the project activities are being conducted in co-operation with WHO(PAHO), IMO and IAEA. The participation in CEPPOL of other agencies as well as national and international funding organizations, is being actively pursued.

33 **The Committee took note** of the information.

34 **The Committee considered** that the co-operative efforts of IOC and UNEP in the Caribbean region constitute a most positive element in achieving best co-ordination, development and consolidation of the IOCARIBE and CEPPOL programmes.

5.2.2 Mediterranean

35 The Technical Secretary described the involvement and activities of IOC in marine pollution research and monitoring in the Mediterranean region. He noted that in support of the UNEP/MEDPOL Programme several research projects have been co-ordinated by IOC in collaboration with the UNEP Mediterranean Action Plan on physical processes, transport of pollutants, bio-geochemical cycles and models. Besides research projects, various workshops on other subjects have been undertaken. Training workshops were organized jointly by IOC, FAO and UNEP in Piran, and Split, Yugoslavia, June 1988 and September 1990 and Athens, Greece, September 1989, on statistical analysis of benthic monitoring data in coastal zones. This activity was based on results obtained at the First IOC Workshop on Biological Effects Techniques (Oslo, Norway, August 1986), including the use of software for statistical analysis developed for that workshop.

36 In co-operation with UNEP, IOC organized a Review Meeting on Oceanographic Processes on Transport and Distribution of Pollutants in the Sea (Zagreb, Yugoslavia, 15-18 May 1989). The importance of physical oceanographic studies in investigating the transfer and distribution of pollutants in the sea was reorganized by the meeting. A Training Workshop for MEDPOL participants dealing with time series analysis of physical oceanographic data was held in Athens, 11-15 December 1990; the use of a PC software package developed for the Workshop was met with success.

37 In response to a recommendation by GIPME-VI to develop methodologies for monitoring on marine and coastal debris in the Mediterranean, IOC, FAO and UNEP convened an ad hoc meeting on persistent synthetic materials in the framework of the Mediterranean Action Plan activities (Athens, 14-16 October 1987) which recommended a pilot monitoring programme of litter in selected areas of five Mediterranean countries. The purpose of the survey, which was co-ordinated by IOC, was to assess the quantity of persistent debris which litters the Mediterranean coastline, to evaluate its geographic distribution, to investigate the seasonal variation of litter quantity, and to define its sources. The results of the survey were reviewed at a meeting organized by IOC, FAO and UNEP, 12-19 June 1989, Haifa, Israel. The report of that review meeting was considered by GEMSI at the Joint GEEP-GEMSI Meeting, Moscow, 15-19 October 1990, who recommended that the methodology used in the Mediterranean pilot monitoring project could serve as a basis for a manual on marine persistent synthetic materials monitoring.

38 The Technical Secretary stressed that the Mediterranean was yet another good example where methods and techniques developed by GEEP and GEMSI have contributed very strongly in the build up and effective implementation of a large regional seas programme and associated monitoring networks.

39 **The Committee expressed** appreciation for the information provided.

5.2.3 IOC Regional Committee for the Western Pacific (WESTPAC)

40 Mr. Y. Jiang introduced this agenda item. He noted that the Sub-commission for WESTPAC adopted the medium-plan for the activities for 1990-1995 at its First Session including two projects in Marine Pollution Research and Monitoring, which are:

(i) Monitoring Heavy Metals and Organochlorine Pesticides using the Musselwatch Approach; and

(ii) Assessment of River Inputs to the Seas in the WESTPAC region.

41 For the implementation of the project, an Experts Consultation on the River Inputs project was held in Dalian, China, 10-20 April 1990 in connection with the GEMSI Workshop on Use of Sediments in Marine Pollution Research and Monitoring. A report of the consultation together with identified river systems to be studied in the project were circulated to member states. Several responses have been received, all of them being positive.

42 He further noted that the Workshop on River Input of Nutrients to the Marine Environment in the WESTPAC Region now is planned for November 1991, possibly in Malaysia. The purpose of the workshop is to bring together scientists in the WESTPAC region to address the following questions:

(i) What are the present fluxes of nutrients (N, P, Si and C) to the Marine environment by selected parts of WESTPAC river systems?

(ii) How have fluxes been altered by man's activities?

(iii) What are the responses of nutrient fluxes in river systems to different anthropogenic activities within watersheds?

(iv) How do nutrient fluxes vary temporally in relation to climatic variability and anthropogenic activities within watersheds?

(v) How do changes in the composition and rate of nutrient fluxes relate to toxic algal blooms?

43 Another activity in WESTPAC will be the IOC/WESTPAC Marine Science Symposium being planned for 2-6 December 1991. The progress of the WESTPAC projects will be reviewed and further study requirement should be identified during the symposium, including the above-mentioned projects in Marine Pollution Research and Monitoring.

44 Mr. J. Karker provided information on the IOC co-operation within the East Asian Seas Action Plan of UNEP. He particularly referred to the oil pollution umbrella project EAS-23 under the East Asian Seas Action Plan, which is pending approval by COBSEA. The IOC in co-operation with IMO will be the Executing Agency for the project comprising three interlinked components: development and calibration of an oil spill trajectory model, monitoring of tar and development of oil spill contingency plans for the Region.

45 **The Committee took note of the information.**

46 The Delegate of China noted that GIPME-VI recommended the initiation of a Musselwatch Programme in China. This is now operational and results will be published in 1992. Research on river inputs is also of high priority in China. He further noted that a National Network for Monitoring of Marine

Environmental Pollution was set up in 1984. He submitted an information document entitled "Introduction to Pollution Monitoring for Offshore Marine Environment in China" which was distributed to participants at the Session.

5.2.4 South-West Atlantic

47 The Technical Secretary described GIPME/MARPOLMON activities in this region.

48 An Associate Expert (Ms. L. Piriz) supported by Sweden has been located in Montevideo, Uruguay, since May 1989. New activities under GIPME-MARPOLMON have been initiated and are underway or planned. A particular effort has been made in heavy metal analysis training and scientists from Uruguay have been trained both within and outside the region.

49 An Intercalibration Exercise for Organic Contaminants is being organized, in co-operation with IAEA/ILMR, with the participation of laboratories from Brazil, Argentina and Uruguay.

50 The Delegate of Brazil noted that the intercalibration exercise for pesticides and hydrocarbons has entered its first stage and a preparatory meeting took place in November, in Mar del Plata (Argentina) while a further meeting is planned in Montevideo, Uruguay, later in 1991 in order to assess results. He further noted that at a training workshop on "The Study of Organic Contaminants in Marine Ecosystems", a proposal was made by scientists from Argentina, Brazil and Uruguay for an international project for research and monitoring of the South-West Atlantic coast.

51 It was noted that the Brazilian exercise in intercalibration on heavy metals will go ahead since IAEA/ILMR has offered to provide the reference materials required. He expressed his appreciation to IOC and IAEA/ILMR for providing support to the intercalibration exercises in the region.

52 The Representative of IAEA, Dr. L. Mee stressed the importance of developing a Quality Assurance Programme in the region. He suggested that advice may be possibly solicited from ICES on the provision of appropriate standards to the Brazilian laboratories. The Representative of UNEP, Dr. M. Gerges, noted with satisfaction the development of IOC activities in the region. Consultations are being held by UNEP with the Governments of Argentina, Brazil and Uruguay for the initiation of an Action Plan for the South-West Atlantic region.

53 The Committee expressed appreciation for the information provided.

5.2.5 South-East Pacific

54 The Technical Secretary introduced this agenda item. He noted that co-operation of IOC with the Comisión Permanente del Pacífico Sur (CPPS) and with UNEP has continued in developing marine pollution research and monitoring programmes and activities in the region.

55 The CPPS-UNEP-IOC Workshop on Monitoring Strategies for Eutrophication in South-East Pacific Coastal Waters was held in Cartagena, Colombia, 7-11 August 1989. A CPPS-UNEP-IOC Regional Seminar on Research and Monitoring of Marine Pollution in South-East Pacific countries (Cali, Colombia, 6-8 September 1989) reviewed the first phase of CONPACSE and recommended future action.

56 A CPPS-UNEP-IOC Regional Training Course on Toxicity Tests and Bioassay Techniques for the Study of Contamination in Marine Ecosystems of South-East Pacific countries was organized in Valparaiso, Chile, 24-28 July 1990, following a similar GEEP training course for Caribbean countries organized in Cartagena, Colombia, in June 1989.

57 CPPS plans to hold the Second Regional Seminar on Research and Monitoring of Marine Pollution

int the South-East Pacific in Santiago, Chile, in November 1991. The purpose is to celebrate the 10 years of the Lima Convention on the Protection of the Marine and Coastal Environment in the South-East Pacific; IOC was invited to participate.

58 The Delegate of Peru noted that Unesco has played some years ago a catalytic role in strengthening scientific and technological development in the region; a number of priority areas had been addressed including water pollution.

59 **The Committee took note** of the information provided **and urged** IOC and UNEP to continue co-operation efforts with CPPS in marine pollution research and monitoring.

5.2.6 IOC Regional Committee for the Co-operative Inviestigations in the North and Central Western Indian Ocean (IOCINCWIO)

60 Mr. J. Karker introduced the Agenda Item, referring to Document IOC/SC-GIPME-VII/Inf.2. He emphasized two recent events with impact on the status of GIPME/MARPOLMON in the IOCINCWIO region: the launching of the UNEP East African Action Plan, with the associated project EAF/6, entitled Assessment and Control of Pollution in the Coastal and Marine Environment of the Eastern African Region and the development of co-operation between IOC and the Swedish Agency for Research Cooperation with Developing Countries (SAREC) in the field of research development relevant to marine coastal management. The EAF/6 as well as the SAREC programme were initiated with the convening by IOC, on behalf of the Co-operating Agencies in the East African Action Plan, and with the financial support of UNEP and SAREC, of a Workshop on Regional Aspects of Marine Pollution, in Mauritius (October-November 1990).

61 The Regional Pilot project on monitoring marine petroleum pollution in the Western Indian Ocean petroleum adopted at the Second Session of IOCINCWIO, and circulated in the region in December 1988, having suffered a delay in its implementation, it has been effectively replaced by the co-operation within the EAF.

62 Mr J. Karker provided information on the programmatic aspects of the IOC-SAREC co-operation with activities of IOC and SAREC running in parallel and mutually reinforcing, and emphasized the integrated approach thus made possible.

63 **The Committee took note** of the information provided **and encouraged** further development of co-operation with SAREC in the region.

5.2.7 IOC Regional Committee for the Central Indian Ocean (IOCINDIO)

64 Mr. J. Karker introduced the Agenda Item. Referring to Document IOC/SC-GIPME-VII/Inf. 2, he drew the attention of the Committee to the development of a regional pollution project focussing on sewage, nutrients and pollution from the land-based sources prepared for extrabudgetary funding, which had been circulated to the Member States in the region for comments. The First Session of IOCINDIO adopted a GIPME/MARPOLMON component focussing on petroleum hydrocarbons, but this had suffered a delay in implementation. The development of a new project had been based on identified problems in the region and would also serve to link the activities of IOCINDIO with those of IOCINCWIO. It was envisaged that the project activities would be complemented by national efforts due to the scope and complexity of the project, as well as financial constraints. It was also envisioned that the project, once implemented/running, would, eventually, be able to provide input to the project SAS-4 of the South Asian Seas Action Plan.

65 **The Committee took note** of the information provided **and agreed** with the go-ahead of the envisaged project for the IOCINDIO region.

5.2.8 IOC Regional Committee for the Central Eastern Atlantic (IOCEA)

66 Mr. J. Karker introduced the item. Referring to Document IOC/SC-GIPME-VII/8/Inf. 2, he described the IOC co-operation within the UNEP West and Central Africa Action Plan (WACAF), through the WACAF/2 project entitled Pollution Monitoring, Research and Control Programme for the Coastal and Marine Environment of the West and Central Africa region, constituting at the same time the GIPME/MARPOLMON component of IOCEA.

The new phase of the project had entailed a re-orientation towards working in selected areas of known or expected contamination, in accordance with the results generated during the first phase of the project. However, the new phase implied a discontinuation of the monitoring of tar balls. The data generated during the first phase would soon be available for inclusion in the IODE system.

67 The Committee took note of the information provided.

5.2.9 Southern Ocean

68 The Vice-Chairman of GEMSI, Dr. J.M. Bewers, introduced this agenda item. He noted that at the request of the IOC Secretariat, members of GEMSI prepared a proposal for the extension of the Open Ocean Baseline Study into the Antarctic circumpolar area. This proposal provided as IOC/SC-GIPME-VII/Inf 4, was approved by GEMSI at its Joint meeting with GEEP in Moscow, 15-19 October 1990. It had also been presented to the SCAR General Assembly (Sao Paulo, Brazil, 16-27 June 1990). The Antarctic is a formation region for two major deep ocean water masses (Antarctic Intermediate Water and Antarctic Bottom Water) and there would be considerable value in studying both the composition of these water masses in the formation region to complement work on other Atlantic deep waters near to northern formation regions. It is advocated that any study of deep water composition in the Antarctic be augmented with studies of the composition of surface water south of the Antarctic convergence (the Wedell and Ross Seas) to determine any unusual characteristics of these waters caused by Antarctic continental influences. Ideally, any extension of the Open Ocean Baseline Study into the southern ocean should incorporate measurements of both organic and inorganic chemical contaminants. This would provide a much improved appreciation of the contrasting distributions of contaminants in different deep water source regions.

69 The delegate of the USA noted that it was absolutely essential to include organics in the field phase.

70 The Committee considered that the extention of the Open Ocean Baseline Study to the Southern Ocean would be both of great scientific interest and would constitute an important contribution to studies in the Antarctic region.

5.2.10 UNEP-IOC Action Plan for the Black Sea

71 The Chairman introduced this Agenda item. He referred to a recent ICSPRO Meeting decision that once an Action Plan is established by UNEP, IOC will take the lead in implementing the marine pollution research and monitoring component. He noted that a joint US-Turkish expedition in the Black Sea to study oceanographic and marine pollution problems took place in 1988, and expressed his personal satisfaction of the development of this Action Plan.

72 The Representative of UNEP, Dr. M. Gerges, indicated that UNEP is pleased to see that an Action Plan is being initiated. Strong interest has been expressed by the countries in the region, and for some time there have been consultations with the National Focal Points and Government Representatives of Bulgaria, Romania, the Soviet Union and Turkey regarding the initiation of the Action Plan.

73 Recently, the four countries formally agreed to proceed with the establishment of an Action Plan

to address various environmental problems of the region. UNEP in co-operation with IOC will soon start the preparations for the Action Plan. As a first step, expert missions will be undertaken to the countries of the region to assess the major marine environmental problems at the national level. Subsequently, a meeting of experts from the region, to consider the technical aspects of the Action Plan, will be arranged by UNEP in co-operation with IOC and the Black Sea coastal states. This will be followed by an Intergovernmental meeting of the Black Sea States to discuss and adopt the Action Plan.

74 The Committee took note of the information provided and enthusiastically endorsed the development of this Action Plan.

5.3 PRESENT AND FUTURE NEEDS OF REGIONAL ACTIVITIES

75 This Agenda Item was introduced by Dr. L. Mee who critically reviewed the percieved requirements for marine pollution assessments and the difficulties faced by past and present monitoring programmes to meet these challenges. He expressed his concern that some regional monitoring programmes appeared to have been copied from those conducted in other regions with little regard to interregional and intraregional differences in the sources, nature and impact of marine pollution. He stressed the need to clearly identify regional priorities and concerns before developing monitoring networks and that such developments should be stepwise, using pilot studies to test whether networks are necessary or viable. Furthermore there is a concomitant need to build and enhance the capacity of many regional laboratories to make environmental contamination assessments and contribute to regional and global monitoring programmes. Isolated actions to enhance this capacity, such as training courses, equipment donations, etc., have not always proven to be cost-effective unless they are properly followed up with continuous maintenance and quality assurance support to the individual laboratories. On-site training (in regional laboratories), though costly, is highly effective as it focusses on the formation of entire groups, rather than upon key individuals (whose permanence in the monitoring laboratory is of limited duration). Dr. Mee suggested that a profound and thorough review of the GIPME strategy should be conducted by the GIPME officers with support from the Groups of Experts. The matter was referred to a working subgroup chaired by Dr J.M. Bewers with a view to formulating an appropriate recommendation to be presented under agenda item 9.7.

76 The Committee endorsed these suggestions.

6. GIPME AND GLOBAL CHANGE PROGRAMMES

77 The Chairman, Dr. N. Andersen, introduced this Agenda Item, referring to Documents IOC/SC-GIPME-VII/6 and 7.

78 He pointed out that a number of emerging research programmes addressing global climate change issues, such as the Joint Global Ocean Flux Study (JGOFS), refer to the environment as integrated, emphasizing interactions between the land, the sea and the atmosphere, long-range transport of various substances and contaminants and their cycling through geo- and bio-geochemical processes, and associated global fluxes. Recent evidence shows that changes in such cycles and fluxes on a global scale due to human interferences, can be considerable. He recalled that this potential involvement of GIPME in these programmes was discussed at SC/GIPME-VI where strong endorsement was given to pursue establishing ties between GIPME programme and JGOFS.

6.1. JOINT GLOBAL OCEAN FLUX STUDY (JGOFS)

79 The Chairman briefly outlined the genesis of the Joint Global Ocean Flux Study (JGOFS) and noted the relationships between IOC and the Scientific Committee on Oceanic Research (SCOR), the International Council of Scientific Unions (ICSU) body under which JGOFS is implemented. He pointed

out the increasing involvement of IOC in the global change research programme, specifically with regard to the implementation of the JGOFS' Indian Ocean Process Study, as a consequence of the strong endorsement given at SC/GIPME-VI to undertake activities to achieve close linkages between GIPME and the emerging global initiatives, addressing climate change issues. He noted that this specific potential involvement of IOC was an outgrowth of an IOC-SCOR consultation on 8 September 1990 and subsequent IOC representation at a JGOFS Steering Committee Meeting in November 1990. There was strong consensus that these efforts be continued, reiterating the position taken at SC/GIPME-VI. The Committee adopted Recommendation GIPME-VII.2.

6.2. OTHERS

6.2.1 Global Ecosystem Dynamics (GLOBEC)

80 The Chairman outlined the GLOBEC programme, which was an effort addressing ecological considerations with regard to climate change. He stressed that this programme was in very formulative stages and there are plans to convene a joint IOC-SCOR meeting in the very near future to address the future development. He further pointed out that depending how this programme developed, there was a strong possibility that GEEP might provide an input in a similar manner to how GEMSI and GESREM interactions with JGOFS are developing.

6.2.2 Land Ocean Interaction in the Coastal Zone (LOICZ)

81 The Chairman briefly introduced the IGBP emerging LOICZ programme, noting that the dominant concern of this global climate change initiative were with the land-sea boundary. He pointed out that study of the coastal zone was crucial in formulating predictions of global environmental change: processes taking place in the coastal seas form major components of the global picture, and these regions are also the repositories of contaminants which affect biogeochemical and nutrient cycles in, as yet, imperfectly understood ways. It is premature, therefore, to pose questions of how "known" global environmental change will affect coastal ecosystems; the converse question of how anthropogenic effects on the coastal seas affect global predictions, is more pertinent. The Committee felt that IOC could make a useful contribution, in connection with the IGBP LOICZ programme, in advancing this thinking since this programme deals with questions which are central to the activities of both GEEP and GEMSI, namely: inter alia to understand the consequences of pollution acting on key organisms and processes within the coastal ocean and shelf seas, for the rates of biogeochemical flux which contribute to the oceanic influence on global climate change. LOICZ required that levels of contamination in key coastal zones of the global land mass be quantified, and the effects of the contamination levels on carbon and nutrient fluxes be evaluated for incorporation in regional and eventually global models for climate prediction. These are common goals of GEEP and GEMSI. The Committee requested that IOC contributions to LOICZ, as well as other developing IGBP Programmes, be strongly encouraged, and that opportunities for an involvement of GIPME's Expert Groups, acting directly and through the regional programmes, be actively sought by IOC, using the developing relationship of IOC in JGOFS as an example.

6.2 OTHERS

6.2.3 Ecological Monitoring of the Oceans Programme (ECOMONOC)

82 The Delegate of the USSR Prof. A. Tsyban described briefly the ECOMONOC programme. She informed the Committee that ECOMONOC was an extension of the MONOC programme and that the goal of this programme was to assess the state of marine ecosystems in relation to anthropogenic impact and climate change; the tasks of the ECOMONOC programme included:

(i) investigation into biogeochemical contaminant cycles and the mapping of the distribution of contaminants

(ii) assessment of the ecological consequences to the world ocean of pollution in various geographical zones;

(iii) assessment of the assimilative capacity in key regions of the World Ocean;

(iv) investigation of the carbon cycle in the ecosystems of the World Ocean and the determination of its role in global climatic processes.

83 ECOMONOC is carried out at both national and international levels. At the national level, investigations are mainly carried out in the coastal zones of the USSR. At the international level, investigations are carried out in the Baltic, Bering and Chukchee Seas and central Pacific (including Caroline Atoll). Prof. A. Tsyban mentioned that this programme can provide MARPOLMON and GIPME with necessary information; she also emphasized the link between ECOMONOC and JGOFS.

84 In view of the importance of the phenomena and processes which are under study in the ECOMONOC Programme and its relevance to GIPME activity, **the Committee recognized** ECOMONOC as an international programme in the frame of GIPME and MARPOLMON.

7. GIPME CONTRIBUTION TO THE 1992 UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

85 The Chairman noted that the IOC Executive Council, at its Twenty-third Session, Paris, March 1990, instructed the Secretary IOC to make a contribution to the 1992 UNCED. In pursuing this task, the IOC Secrertariat has been represented at the UNCED Preparatory Committee meetings and provided in suitable form inputs through the Commission's programmes.

86 The Secretariat provided a brief overview of the present status of preparations for UNCED. Following the First Preparatory Committee meeting, Nairobi, August 1990, it was decided that a comprehensive report on "Oceans" be prepared with six chapters.

87 In addition three documents should be prepared on addressing the role of global ocean observing system in the protection of the ocean.

88 Dr. L. Mee stressed that good communications were necessary between Agencies and Member States in order to achieve optimal contributions to UNCED.

89 The Delegate of Canada informed the Committee that an Intergovernmental Experts Meeting on Land-Based Sources was scheduled in Halifax, Canada, May 1991, to which the IOC had been invited to contribute.

90 **The Committee took note** of the information provided.

91 **The Committee recommended** that IOC give a very high priority to the preparation of a contribution to UNCED that would include inputs from GIPME.

92 **The Committee adopted** Recommendation SC-GIPME-VII.3.

8. CO-OPERATION AND CO-ORDINATION WITH OTHER BODIES AND PROGRAMMES

8.1 CO-SPONSORING BODIES AND PROGRAMMES

8.1.1 International Atomic Energy Agency (IAEA)

93 A review of past and planned co-operative activities involving the International Laboratory of Marine Radioactivity (ILMR) in Monaco was presented by the IAEA representative, Dr. L. Mee. The ILMR was established almost 30 years ago, initially to address widely expressed public concerns on marine contamination derived from nuclear weapons testing. As the scope of its activities widened, ILMR became increasingly involved in collaborative efforts with other UN Agencies, particularly in the field of data quality assurance inmprovement for regional and global pollution monitoring studies. Since ILMR is the only marine science laboratory in the UN system, its interaction with other agencies grew to the point that a new section, designated the Marine Environmental Studies Laboratory (MESL) was created in 1986 concerned exclusively with work on non-nuclear marine contaminants in close association with UNEP and IOC.

94 MESL is co-ordinating a major joint UNEP/IAEA/IOC project for the provision of comprehensive technical support to regional and global marine pollution monitoring programmes. This work includes the development and testing of reference methods (in association with GEMSI), the organization of intercalibration exercises and production of reference materials (in association with GESREM), training courses (both in house and in member states), instrument service support and the provision of technical assistance for the development of new or revised marine pollution assessment programmes (such as CEPPOL). The laboratory carries out pilot monitoring exercises worldwide (usually as a joint activity with national laboratories). It also acts as a regional analytical centre for UNEP's MEDPOL programme.

95 A further aspect of this work has been the recent initiation of multi-agency sponsored monothematic biennial "Monaco Symposia on Marine Pollution" which are designed to promote the exchange of scientific information on themes of common concern to several regional programmes. Both IOC and UNEP were co-sponsors of the first activity of this kind, the 1990 International Organotin Symposium which attracted over 70 scientists from 16 countries.

96 In 1990, a new agreement was signed between IAEA and IOC to further strengthen ties in the application of MESL's technical capacity and experience to IOC's regional programmes, particularly in the field of oceanographic and analytical instrument support services. It has recently been announced that ILMR will be moving to larger and permanent custom-built facilities in Monaco in approximately three years and this will allow for further development of its co-operative work through MESL.

97 Dr. Mee suggested that the success of MESL as a mechanism for providing common support facilities on maintenance, training and quality assurance (and thus guarantee the continuity of monitoring programmes), could be used as a model to spawn similar facilities serving other regions. The feasibility of such an approach is currently being studied in order to serve IOC and UNEP's programmes in Latin America and the Wider Caribbean.

98 **The Committee took note of the information provided.**

99 **The Committee expressed appreciation for the efforts made by IAEA/ILMR in serving, through its highly specialized expertise, not only the Mediterranean, but also other regional monitoring programmes.**

8.1.2 International Maritime Organization (IMO)

100 The Technical Secretary introduced this agenda item. He noted that co-operation between IOC and IMO is long standing and it is also in the frame of the ICSPRO Agreement. IOC, through the GIPME Groups of Experts provides scientific advice to IMO's Marine Environment Protection Committee (MEPC) and for the needs of International Conventions in particular the London Dumping Convention (LDC) and MARPOL 73/78. GEEP is co-sponsored by IMO. Following a request by MEPC, GEEP provided

scientific opinion on vulnerable areas. A GEEP expert, Dr John Gray presented the positions of GEEP to an IMO/HELCOM/Sweden International Conference of Specially Sensitive Areas, Malmö, Sweden, September 1991. The Vice-Chairman of GEMSI, Dr. J.M. Bewers has represented IOC at several LDC Consultative meetings. The ICES-IOC seagoing Workshop on Biological Effects of Pollutants were presented to the Twelfth LDC Consultative Meeting, London, 30 October - 3 November 1989; of particular interest to the LDC Consultative Group was the sea surface microlayer studies which were planned and carried out during that GEEP Workshop.

101 IOC was represented to the International Conference on Oil Pollution Preparedeness and Response, IMO, London, 19-30 November 1990. At a similar regional conference for the Caribbean region, Caracas, Venezuela 1991, the representative of IOCARIBE presented the results of CARIPOL on petroleum hydrocarbon and on marine debris. These data were recognized as contributing to the designation of the Caribbean as having a Special Area Status under Annex V of MARPOL 73/78.

102 IOC has supported one lecturer to an IMO-China Seminar on Waste Disposal at Sea, Shanghai, 11-17 September 1989 and three lecturers at similar seminar for the west and central Africa region, Abidjan, Côte d'Ivoire, 28 May - 1 June 1990.

103 IOC has supported three lecturers who have presented a package on marine pollution to the World Maritime University, Malmö, Sweden, for 4 consecutive years since 1987. Several hundred students of the University have received this training.

104 **The Committee expressed** appreciation for this information and **considered** it important that close co-operation between IOC and IMO is maintained.

8.1.3 United Nations Environment Programme (UNEP)

105 The representative of UNEP, Dr. M. Gerges, referred to the longstanding co-operation between IOC and UNEP in several areas of mutual interest and expressed UNEP's satisfaction with the increasing co-operation between the two organizations and the good results obtained, thus catering for the needs of the Member States of IOC and UNEP's Regional Seas Programme in an effective manner.

106 With this in view, UNEP has co-sponsored the three GIPME Groups of Experts (GEMSI, GEEP and GESREM) and the International Musselwatch Programme, and supported several GIPME-related activities and initiatives.

107 Considering GIPME as one of the essential areas of co-operation between UNEP and IOC, there have been constructive negotiations between the two Secretariats to consider GIPME as a joint IOC-UNEP programme and to offer GIPME as a contribution to the GEMS/Earthwatch System of the United Nations. This lead to the adoption of Resolution EC-XXIII.2 by the 23rd Session of the IOC Executive Council (March 1990) concerning the co-sponsorship by IOC and UNEP of the GIPME Programme.

108 A similar resolution has been agreed to by the upper Management of UNEP, and is expected to be proposed to the Governing Council of UNEP at its 16th Session in May 1991. As soon as the resolution is adopted by the Governing Council of UNEP a joint IOC-UNEP Intergovernmental Panel on GIPME will be established in accordance with the standard procedures of IOC and UNEP. The Terms of Reference of the Panel were adopted and are given in the above-mentioned Resolution of the IOC Executive Council.

109 UNEP is looking forward to continuing its fruitful co-operation with IOC in the framework of the joint GIPME Programme.

8.2 NON-CO-SPONSORING BODIES AND PROGRAMMES

8.2.1 International Council for the Exploration of the Sea (ICES)

110 The ICES Observer made the following statement regarding cooperation with IOC/GIPME. ICES shares interests in the state of the marine environment and contamination/pollution issues with IOC-GIPME. ICES has two major areas of interest: fisheries management and marine environmental protection. In the area of environmental protection, ICES provides advice through the Advisory Committee on Marine Pollution (ACMP) to the Helsinki protection and the OSLO and Paris Commission that regulate respectively the introduction of substances into the Baltic Sea and the eastern North Atlantic respectively. ICES is also a party, with the Oslo and Paris Commission, to the North Sea Task Force that undertakes marine environmental studies and assessments in the North Sea pursuant to the decisions of the International North Sea Conference process.

111 For over a decade, there have been close cooperative arrangements, initially on an ad hoc basis and later on a more formal bases, between ICES and IOC/GIPME at the level of expert working groups. The ICES Working Groups on Marine Chemistry and Marine Sediments have similar responsibilities within ICES as GEMSI has within IOC/GIPME. Similarly, the ICES Working Group on Biological Effects of Contaminants has a similar role to that of GEEP. There are several other areas of comparability between activities in ICES with those in IOC/GIPME. Through common memberships of individuals on ICES Working Groups and ACMP and on GEMSI, GEEP and GESREM very close and cooperative relationship between both parent organizations in the field of marine environmental protection have been developed and maintained. Joint IOC and ICES sponsorship of intercalibrations and Biological Effects Workshops have been tangible results of this relationship. ACMP is also a strong exponent of the philosophy underlying the GIPME programme.

112 There is no question that substantial improvements in capabilities for the assessment of conditions and threats to regional marine areas has been obtained through this close relationship.

113 Accordingly, increased benefits have accrued to both organizations as a consequence of closer cooperation. ICES is pleased to acknowledge the benefits of this arrangement and hopes for the maintenance of such cooperation to mutual advantage in the future.

114 If there is a trend within ICES that might increasingly influence the development of GIPME in the future, it is

(i) more balanced recognition of human health protection in relation to marine ecological protection and

(ii) greater attention to eutrophication/harmful algal bloom issues.

115 **The Committee noted with appreciation the continuing co-operation with ICES and urged that it be further developed.**

The Committee adopted Recommendation GIPME VII.4.

8.2.2 Other Bodies and Programmes

World Meteorological Organization (WMO)

116 The Committee was informed by the WMO Representative, Dr. Yves Treglos of the project underway within the framework of the WMO Commission for Marine Meteorology (CMM), called "Meteorological Services on Support of Marine Pollution Emergency Response Operations". The project

is at the very early stage of preparation where (a) rapporteur(s) will be appointed to develop a proposal for a global system of designated responsible countries and/or centres for the provision of meteorological support to marine pollution emergency operations on the high seas. Since the proposal should include appropriate terms of reference for the countries/centres designated under the system, it was felt necessary that,in the first instance, the rapporteur(s) be able to access the relevant scientific expertise, including this available through the IOC Committee on GIPME.

117 The Committee expressed satisfaction to this WMO undertaking and considered it should endeavour to support the project as far as possible. Notwithstanding possible further developments, it therefore recommended that, as a first step, the IOC Secretariat be entrusted with facilitating all kinds of communications between CMM and GIPME experts, in order that the afore-mentioned terms of reference, when being developed, take into account the specific characters of marine pollution.

Baltic Marine Environment Protection Commission - The Helsinki Commission (HELCOM)

118 Mr. J. Karker introduced the item, noting that the reciprocal Observer status between IOC and HELCOM was rather young, and that IOC for reasons of shortage of human resources had not participated in the work of HELCOM to the extent it would have wished. He went on to emphasize that the IOC participation in the HELCOM informal expert meeting on the Helsinki Commission Data Banking, held in Helsinki, December 1990, had been considered extremely useful, and that further areas of cooperation with HELCOM would be explored, possibly in co-operation with ICES.

119 The observer from HELCOM, Dr. Eeva-Liisa Poutanen, provided information on current activities of HELCOM and expressed the hope that additional formal areas of co-operation would be identified in due course.

120 The Committee took note of the information provided.

International Commission for the Scientific Exploration of the Mediterranean Sea (ICSEM)

121 The Technical Secretary described briefly co-operation between IOC and ICSEM through a number of activities and programmes in the Mediterranean region. IOC together with ICSEM and UNEP organize every two years Marine Pollution Workshops, taking place during the ICSEM General Assembly Conference; the last one was held at Perpignan, France, October 18-19, 1990. IOC maintains close co-operation with ICSEM in developing the Ocean Science in relation to Non Living Resources Programme components and Ocean Mapping activities for the Mediterranean.

122 **The Committee took note of the information provided.**

Marine Mammal Commission

123 The Technical Secretary informed the Committee on a recent communication from the Marine Mammal Commission who submitted to GIPME reports on marine debris monitoring projects carried out by the Commission. He noted that a manual on marine litter monitoring was in preparation under a contract witht the US National Marine Fisheries Service.

124 It was noted that the Marine Mammal Commission expressed the wish for co-operation with the IOCARIBE marine debris monitoring project. A study was also supported on marine debris on beaches of South-West Atlantic.

125 **The Committee took note of the information.**

126 **The Committee requested** the IOC Secretary to pursue further co-operation with the Marine Mammal Commission.

9. FUTURE INTERSESSIONAL ACTIVITIES AND UPDATED GIPME ACTION PLAN

9.1 GROUP OF EXPERTS ON METHODS, STANDARDS AND INTERCALIBRATION (GEMSI)

127 The Chairman of GEMSI, Dr Anthony Knap provided an overview of the activities and future plans of the Group.

128 He highlighted some of the main activities of the Group: the long planned Open Ocean Baseline Study had finally been initiated during a cruise of R/V METEOR in Spring 1990; the Workshop on the Use of Sediments in Marine Pollution Research and Monitoring had taken place in Dalian, China, April 1990; the manuals on the determination of petroleum hydrocarbons in sediments and on sampling, extraction and determination of chlorinated biphenyls in open ocean waters had been finalized; the quality assurance programme had made good progress particularly through co-operation with the IAEA/International Laboratory for Marine Radioactivity (ILMR).

129 Dr. Knap pointed out that interactions with GEEP which started during the Oslo Workshop in August 1986, were addressed in detail at the Joint GEEP-GEMSI Meeting, Moscow, 15-19 October 1990.

130 With regard to future activities, he noted that the continuation of the Open Ocean Baseline Study and GEMSI contributions to International Musselwatch were main actions.

131 Mass balances including atmospheric inputs are very important and will need further consideration. New contaminants, such as non-persistent agrochemicals, should also be addressed. GEMSI-GEEP interactions should increase. A joint GEMSI-GEEP Workshop in Mazatlán, Mexico, is planned for 1992. Bioavailability and cause-effect relationships are some of the issues to be addressed as well as ecotoxicological problems. Interactions with GESREM should also be increased.

132 The representative of UNEP, Dr M. Gerges, expressed UNEP's satisfaction with the achievements of GEMSI as a joint IOC-UNEP Group of Experts, and in particular with their support of the Regional Seas Programme through reviewing several of its Reference Methods and advising on technical aspects related to intercalibration and training.

133 The ICES Observer wished to clarify the reference to evaluations of bioavailability and proposed it be undertaken by GEMSI. ICES is conducting an evaluation of bioavailability in the context of sediment quality guidelines, scheduled to March 1991. GEMSI, through liaison provided by two of its members who will be intimately involved in the ICES activity, will monitor the progress and results of this study before embarking on any independent assessment of bioavailability.

134 The attention of the Committee was drawn to the need to expand its contacts with the appropriate officials of the European Community so that it can be more fully informed on current marine developments being supported in community countries.

135 The Delegate of the Republic of Korea, suggested that the conventional method of pollution monitoring by means of routine sampling and analysis needs to be compensated by new method of real-time in situ instrumental monitoring and/or remote sensing, especially for those parameters that vary rather rapidly with time and space. He noted that unattended automatic monitoring of chemical and biological parameters was a very difficult task, though not impossible; modern advancements in technology, the use of microprocessors and optical fibres would be helpful for tackling this task in the near future. He pointed out that they would be able to work on the problem intensively in Korea, since the Integrated Coastal Monitoring Network programme was recently accepted as a national project in his country. He suggested

an increased co-operation between member states in the development and implementation of new methods of in situ monitoring of marine pollution in the future. An international workshop would be helpful in exchanging views and technologies in this field; this could possibly be held in 1994.

136 The Committee discussed the new approaches required and the need of more co-ordination and integration in order to achieve more effective results of actions, particularly in respect of the developing countries. The Committee considered it important that interactions between GEMSI and GEEP as well as GEMSI and GESREM should increase. The Committee urged GEMSI and its co-sponsoring agencies to also pursue interactions with new large international and national programmes including JGOFS, ECOMONOC, etc.

9.2 GROUP OF EXPERTS ON EFFECTS OF POLLUTANTS (GEEP)

137 The Delegate of the United Kingdom, Dr. Alistair Bullock, presented an overview of GEEP's more recent activities. He noted that most of the objectives were being fulfilled; more specifically the objectives were:

(i) To facilitate and enhance development of techniques for the quantitative measurement of biological effects on marine organisms;

(ii) To pursue evaluation of techniques in real situations in the field;

(iii) To disseminate these techniques to the scientific and user community at large via workshops and the preparation of manuals.

138 A major intersessional activity was the joint ICES-IOC Sea-going Workshop on the Biological Effects of Contaminants in the North Sea, Bremerhaven, 12-30 March 1990. This was the third in the IOC series, the first being the Oslo Workshop (1986) and the second the Bermuda Workshop (1988). The fourth was planned for Xiamen, People's Republic of China in 1991 or 1992, the exact timing depending on the outcome of discussions with the Chinese authorities.

139 The Oslo and Bermuda Workshops, as well as having been published by IOC in the Workshop Reports Series, were also published as special issues of international scientific journals.

140 Training activities included four workshops in the Mediterranean on the statistical treatment and interpretation of marine community data and two workshops on bioassay techniques in the Caribbean and CPPS region.

141 GEEP will continue its activities under four heads:

(i) research assessing the biological effects of pollutants;
(ii) training in techniques for measuring such effects;
(iii) the production of manuals describing such techniques;
(iv) collaboration with GEMSI and with the IOC-UNEP regional programmes in all of these endeavours.

142 GEEP had successfully applied to the US Rockefeller Foundation to hold a discussion workshop at their Study Centre in Bellagio, Italy, 11-15 March 1991. This meeting will aim to evaluate the future role of biological effects studies of marine organisms and systems in the context of regional and global programmes for the study of climate change. GEEP has recognized that there is an important role here for GIPME and intends to determine the most effective way forward, through discussions at Bellagio. They

will report back to IOC/GIPME on the agreed features and applications of biological effects techniques on regional and global programmes investigating element and nutrient fluxes and their role in climate change.

143 A joint IOC-ICES Symposium will be held in September 1991 to discuss and to communicate the results of the North Sea Biological Effects Workshop held in Bremerhaven, March 1990.

144 A training workshop in benthic community analyses, is to be held in the wider Caribbean and/or south-eastern Pacific (CPPS) region, as a complement to their on-going programme of training in toxicity bioassays. GEEP would give this a high priority, but plans depend on GEEP receiving an invitation from the region(s).

145 A joint IOC-UNEP-FAO training workshop is currently under discussion for the Mediterranean area, in the application of biochemical and physiological techniques in marine monitoring.

146 Three manuals currently in preparation will be completed viz: the statistical analysis and interpretation of benthic community data; the induction of mixed function oxygenase activity in marine monitoring; the scope of growth in marine bivalves. A fourth manual (tentative title: Metallothionein in fish as an indication of pollution by heavy metals) is under discussion and arrangements will be made for its preparation.

147 A joint GEEP-GEMSI Study Group will be convened to consider a combined research/training workshop to evaluate linked chemical and biological analyses of the environmental fate and effects of non-persistent pesticides and other contaminants in the coastal zone. A proposed site for this workshop is Mexico.

148 The representative of UNEP indicated that GEEP's work was regarded highly relevant to UNEP's Regional Seas Programme, hence the Co-sponsorship of GEEP by UNEP. Referring to the planned meeting of GEEP in Bellagio, Italy, as an important discussion meeting to consider the future direction of GEEP at this crucial stage of its development, the UNEP representative emphasized the importance of adequate representation by the Co-sponsors of the Group at this meeting, to ensure that the future activities of GEEP will adequately reflect the needs of the Co-sponsors and the laboratories participating in their programmes in the various regions.

149 The Delegate of China informed the Committee that all preparations for the planned workshop in Xiamen have been completed.

150 The Delegate of Venezuela expressed appreciation on the information which was provided, particularly on future plans for training activities; she indicated that this information would permit to explore the possibility to host a future training course in Venezuela.

151 **The Committee expressed its appreciation** for the information provided.

152 **The Committee thanked** the delegate of China for the invitation to host the Biological Effects Workshop.

9.3 GROUP OF EXPERTS ON STANDARDS AND REFERENCE MATERIALS (GESREM)

153 The representative of the GESREM chairman recalled the approval of the creation of the Group at the Sixth Session of GIPME (Document IOC/WC-GIPME-VI/3) and the terms of reference assigned to it at that time. The broad nature of these terms of reference emphasized the service and support nature of the Group with respect to the on-going activities of the expert groups GEMSI and GEEP and the obvious

need to maintain close relations with these groups and on-going international oceanographic and marine pollution projects.

154 In January 1990 GESREM held its second session in Halifax, Canada, where programme requirements were quantified by the UN Agencies and participants in key projects such as the Open Ocean Baseline Study, JGOFS, WOCE, the International Musselwatch and JPOTS (Document IOC-IAEA-UNEP/GGE(SRM)-II/3).

155 A listing of the requirements for reference materials considered at GESREM-II confirmed the current needs for production of several standards and reference materials, the feasibility of preparation and the status of efforts to furnish a number of these materials. The Group identified considerable scope for further co-operation between GESREM and GEMSI in aspects of quality control including the wide dissemination of guidelines for improved experimental design and the best use of marine standards and reference materials in laboratory determinations. In this respect GESREM offered to assume a defined role in keeping with its expertise and capabilities

156 A core group of GESREM was appointed to undertake the co-ordination of certain intersessional activities. Since the second session of GESREM, the Committee noted that considerable progress had been made in the production and certification of two reference materials. GESREM-I (mussel tissue-trace metals) has already been collected , lyophilized and homogenized by ILMR/IAEA and is now undergoing certification by NIST (USA) and NRC (Canada). A second sample of mussel tissue (certified for organochlorines and PAHs - GESREM-II) will be collected shortly from a suitable coastal location.

157 Since the first publication of the catalogue of "Standards and Reference Materials for Marine Science" (Dr. A. Cantillo, NOAA), IOC in collaboration with other Agencies has reprinted 1,600 copies and these are now available on request.

158 The representative of UNEP, Dr M. Gerges, pointed out that GESREM being co-sponsored by UNEP, is becoming more responsive to the needs of UNEP's Regional Seas Programme. In UNEP's view, GESREM is considered to be more important than a service Group. It is rather a supporting Group which will make it possible for laboratories participating in the Regional Seas Programme of UNEP, particularly in Developing Countries, to obtain the reference materials and standards necessary for Quality Control of data obtained by these laboratories.

159 The UNEP representative further noted with satisfaction the progress achieved by the core group of GESREM, and with the agreement reached during GESREM-II to expand the mandate of the Group to cover all aspects related to Quality Control, thus contributing to the improvement of data quality and comparability, essential for achieving meaningful results from any monitoring programme.

160 The Committee noted the willingness of GESREM to accept the wider responsibility for quality control aspects in the use of reference materials. It commended the real progress made recently in the preparation of some materials and emphasized the particular value of such materials to laboratories in developing countries.

161 The Committee accepted the report of GESREM (Document IOC-IAEA-UNEP/GGE(SRM)-II/3) and approved its workplan and timetable.

162 The Committee adopted Recommendation GIPME VII.3.

9.4 OPEN-OCEAN BASELINE STUDY

163 This agenda item was introduced by Dr. D. Schmidt, referring to documents IOC/SC-GIPME-VII/Inf. 3 and IOC/SC-GIPME-VII/Inf.3 rev.. He explained the rationale for the choice of sampling

locations during the cruise of the R/V METEOR in the East Atlantic, 13 March - 15 April 1990, together with a description of the sampling procedures and types of samples which had been processed by a team of 13 scientists.

164 The proposal of the R/V METEOR cruise participants to hold a meeting about one year after the cruise was noted by Dr. Schmidt. This would provide the opportunity for an in-depth discussion of the data, provide for coherent evaluation of results, and prepare a joint, bi- or multi-lateral publication. It was considered necessary that about 20-30 experts from the analyzing laboratories should participate - approximately half from Europe and half from North America. This would also provide an opportunity for planning the second baseline cruise in 1992.

165 Dr. Schmidt presented a "Proposal for the continuation of the GIPME Programme on Open Ocean Baseline Surveys for Trace Contaminants" (Document IOC/SC-GIPME-VII/Inf.7). This proposal envisaged inter alia the establishment of a GIPME Group of Experts on Open Ocean Baseline Surveys.

166 The Committee expressed its appreciation to Dr. D. Schmidt for the efforts he has realized as well as the cruise scientific participants, to carry out what appeared to be a very successful ocean experiment. The Committee also expressed appreciation to Germany for the offer of shiptime by the R/V METEOR. The Committe endorsed the proposal for convening the meeting referred to above.

167 The Committee discussed the proposal for continuation of the Opean Ocean Baseline Surveys, agreeing fully with the need to continue the surveys in particular by including organic contaminants as well as inorganic. However, the Committee considered that the creation of another group of experts would be expensive and might generate further administrative burdens to management questions.

168 The Committee decided that this activity should continue to be under GEMSI and that the Group should take care of appropriate management mechanisms in co-ordination with the IOC Secretariat.

9.5 THE INTERNATIONAL MUSSELWATCH PROGRAMME

169 Dr. N. Andersen introduced this agenda item. He noted that after two years of planning by the International Musselwatch Committee, partial funding for the initial operational phase, (i.e. the Americas), is to be made available from IOC, UNEP and the US-NOAA. The programme is to measure persistent organochlorine pesticides and chlorobiphenyls in sentinel bivalves from around the coast of the Caribbean, Central and South America, as the first step in the global programme. At the same time the on-going US NOAA-Status and Trends Programme will monitor the North America coastline, hence providing a North-South quasi-synoptic baseline of the contamination of the coastal environment.

170 Dr. L. Mee noted that the programme is ambitious but timely, since it will provide a baseline on which to build regional monitoring programmes. Many of the UNEP Regional Seas Action Plans already contain commitments to conduct mussel watch-type programmes and, in many areas, groups and infrastructures are in place to ensure the programme's success. Specifically, the recent implementation of the CEPPOL Programme should expedite the logistics of collections in the Wider Caribbean.

171 He further noted that GESREM has planned to produce a reference material, for the Musselwatch Programme.

172 The delegate of the USA noted that although UNEP, IOC and the USA have committed considerable resources, it was necessary to identify additional funds required to continue the programme, and that it would be unrealistic to assume that the USA would continue providing such a large share of the costs. He suggested that a roster be created and maintained on all existing national musselwatch programmes.

173 The representative of UNEP, Dr M. Gerges, indicated that UNEP, together with IOC, and with strong support from USA, co-sponsors and finances the International Musselwatch Programme, and considers it as a promising and worthwhile undertaking. It was hoped that the results obtained from the pilot operational phase of the programme, would prove to be useful and encouraging to expand the programme to other parts of the world ocean. With this in view, UNEP would be ready to consider the continuation of its support to the IMW within available resources.

174 The Committee expressed its appreciation for all the work accomplished, in particular to overcome problems and to launch the programme.

175 The Committee urged international organizations and requested that Member States also be urged to commit the required resources to further strengthen this important programme.

9.6 SECOND INTERNATIONAL SYMPOSIUM ON INTEGRATED GLOBAL OCEAN MONITORING (IGOM-II)

176 The Delegate of the USSR, Professor A. Tsyban noted that the preparation of the Second International Symposium on Integrated Global Ocean Monitoring is going on in accordance with the timetable.

177 She emphasized that since the First International Symposium on International Global Ocean Monitoring in 1983, Tallin, USSR, new scientific information in the field of marine ecology has been accumulated and the central role of the ocean in the functioning of the earth's climate system has been demonstrated. Within the framework of leading international programmes and national projects, a great deal of information has been obtained which requires comprehensive consideration and analysis. As a result, the Second Symposium on Integrated Global Ocean Monitoring will be held 15-20 April 1991 in Leningrad, USSR, addressing the following specific scientific themes:

(i) Current state of marine environment;
(ii) Consequences of anthropogenic inputs upon marine ecosystems;
(iii) The role of the ocean in the climate and climate change;
(iv) Biochemical cycles of the biogenic elements and contaminants in the World Ocean;
(v) IGOM - issue, strategies, methods and products.

178 During the preparation of the Symposium IGOM-II, two meetings of the International Organizing Committee took place; one in Moscow, 16-17 October 1990, the other in Leningrad, 18-19 January 1991. The scientific programme structure and timetable of the Symposium were finalized. Several international organizations, i.e. IOC, UNESCO, UNEP and WMO, agreed to sponsor IGOM-II.

179 The representative of UNEP noted that there was hope that this Symposium will enlighten the agencies with some new ideas and be a forum of thorough discussion on problems of ocean monitoring. His concern was that a very small number of developing countries would be able to participate and he urged the organizations to facilitate the participation of scientists from these countries.

9.7 UPDATED GIPME ACTION PLAN

180 Dr. A. Knap, Chairman of the ad hoc Drafting Group of the Second GIPME Action Plan, presented the report of the ad hoc Group. He referred to Document IOC/SC-GIPME-VII/7 "Draft Action Plan for GIPME" which was revised by the Drafting Group. Activities by the Group of Experts for the term 1991-1993 were described, including priorities and resources required.

181 The Committee expressed appreciation to Dr. Knap and the ad hoc Group for their excellent work, attached to this report as Annex IV.

182 **The Committee discussed** some projected activities in more detail and requested that the Chairmen of GEEP and GESREM also be contacted in order to provide their further inputs or amendments on the planned activities.

183 **The Committee decided** that GEMSI should continue the effort to complete the methodological manual on marine debris monitoring, based on the IOC-FAO-UNEP report on the results of the Mediterranean pilot monitoring project, giving due consideration to a similar manual prepared by the Marine Mammal Commission.

184 **The Committee approved** the revised GIPME Action Plan, and the Committee **adopted** Recommendation GIPME-VII.6.

185 Dr Bewers presented the report of the ad hoc Group on MARPOLMON which is presented as Annex V. The ad hoc Group commenced its review with an assessment of the most important issues in each region as reflected by the report on intersessional activities under MARPOLMON, augmented with views of the members of the Group having knowledge of regional MARPOLMON activities, and the regional assessments conducted in connection with the GESAMP review of "The State of the Marine Environment". A table relating primary issues with individual regions was prepared and used to identify issues of widespread concern. The issues of most ubiquitous concern are erosion/turbidity/ siltation, eutrophication and sewage/pathogens. Existing deficiencies in the regional abilities to undertake assessments of these issues have been identified and, where appropriate, suggestions are made for additional work by the GIPME Groups of Experts. The remaining issues (pesticides, litter/marine debris, hydrocarbons, and heavy metals) are also analyzed in terms of their relative priority, ease of applied study, adequacy of methodology and manuals, and interpretability of results of regional survey and monitoring studies. Finally, some comments on petroleum hydrocarbon spills/accidents and polycyclic aromatic hydrocarbons are made in relation to GIPME responsibilities and priorities.

186 **The Committee** while **recognizing** that this review had been necessarily superficial and incomplete, **concluded** that a comprehensive review of MARPOLMON in relation to regional concerns, both within IOC and UNEP, would be warranted and **recommended** that this work be carried out intersessionally.

187 **The Committee further recommended** that despite the preliminary nature of this analysis, a number of scientific and technical issues should be further studied by the GIPME Groups of Experts in order to enhance regional abilities to study and assess them.

188 **The Committee expressed** its appreciation to Dr. Bewers and the ad hoc group for their excellent report, attached as Annex V to this report.

189 **The Committee adopted** Recommendation GIPME-VII.7.

10. INTERACTIONS WITH OTHER IOC PROGRAMMES

10.1 TRAINING, EDUCATION AND MUTUAL ASSISTANCE IN THE MARINE SCIENCES (TEMA)

190 Dr. K. Kitazawa introduced this agenda item. He noted that at its Fourth Session in June 1984, the IOC Committee for Training, Education and Mutual Assistnce in Marine Sciences (TEMA), agreed that elements of the TEMA programme should be considered as inherent parts of the subject area programmes of IOC and that the TEMA programme should operate generally in close liaison with both the global subject area programmes and their regional components. He stressed that this approach should be dynamically strengthened. Since 1984, eighty-two group trainings were supported through the TEMA programme and twenty-four were related to the marine pollution and monitoring programme.

191 It was noted that shipboard training constitutes an important activity in which scientists and technicians from developing Member States are provided with opportunities to participate in sea-going research training. Although over seventy scientists participated in on-board training in about thirty research cruises, only two ship-board opportunities were offered in marine pollution related cruises.

192 Dr. Kitazawa noted that the Fifth Session of the IOC Committee for TEMA will be organized in Paris, 25 February to 1 March 1991. The GIPME Committee's proposals and/or comments on the appropriate ways and means to develop dynamic linkage between the two programmes will be useful base material for the session. The intention of future TEMA plans was to organize training activities particularly switched to programmes and GIPME would be one of them.

193 **The Committee discussed** the need of improving interactions between TEMA and GIPME. Several delegates mentioned national or regional initiatives in regard to training and education and possible ways for more effective co-ordination including incorporation of training in integrated programmes with various elements: instrument donation, service, maintenance, quality assurance programmes training at regional laboratories.

194 **The Committee undertook** the preparation of training plans for the further implementation of GIPME as part of the updated Action Plan for GIPME under Agenda item 9.7. There would be, within this Action Plan, specific training activities to be executed in conjunction, and with the assistance of TEMA. Accordingly, there was a need for the IOC Secretariat to ensure that GIPME training requirements and plans were presented to the next meeting of the IOC Committee for TEMA, to be held 25 February - 1 March 1991.

195 In this respect, **the Committee expressed** its regret that more detailed material on TEMA activities and plans, particularly the development of a strategy for TEMA, had not been provided to the delegates prior to the meeting so that a more complete examination of opportunities for TEMA involvement in GIPME could be made.

196 **The Committee recommended** that Member States be urged to contribute as far as possible in the implementation of the joint IOC/IAEA project on donated instruments, service, maintenance and training and **requested** the IOC Committee for TEMA to consider this project for incorporation in their future Action Plan.

10.2 INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE (IODE)

197 Mr. T. Sankey, IOC Assistant Secretary, presented the activities of the IOC Committee on International Oceanographic Data and Information Exchange (IODE). Three regional data centres for MARPOLMON data are now operating in Japan, USSR and the USA as part of the IODE data centre system. Their official designation is RNODC-MARPOLMON. IOC through IODE has increased its support to the ASFA bibliographic database and journal which now has a separate part, ASFA 3, entitled Aquatic Pollution and Environmental Quality. The MEDI Data Directory system describes significant data holdings available for international exchange and Mr. Sankey invited the co-operation of the marine pollution community in providing descriptions of their datasets for MEDI.

198 A major development in IODE is the OCEAN-PC project to produce in 2-3 years time an integrated PC software package for the processing, storage, management and exchange of data with particular emphasis on the needs of developing country laboratories and data centres. A sub-project starting this year will collect, evaluate and distribute existing data management software to scientists and data centres. The facilities required to handle marine chemistry, biology, pollution and coastal zone monitoring data will be included in OCEAN-PC. Information from GIPME members on their needs would be welcome. **The Committee expressed interest** in the OCEAN-PC concept and requested that IOC distribute information about OCEAN-PC products widely so that it reaches individual marine scientists.

199 The Thirteenth Session of the Committee for IODE, New York, January 1990, placed a strong emphasis on building collaboration on data management between IODE and the major international marine science programmes. While some activities are done under the IODE label and others under those of individual scientific programmes, many of the same experts and data centres are involved in both forming a single data management community and the different activities complement and cross fertilize each other. **The Committee was pleased to note** that there are active contacts between the IODE and the data management activities of JGOFS and IGBP, and that the data management committees of these programmes include IODE experts. **The Committee recommended** that these links be continued and strengthened, and that in particular IODE experts ensure liaison with the JGOFS international office located in Germany. In view of these links, **the Committee concluded** that it is not necessary to proceed with the earlier proposal for a joint IODE-GIPME Task Team.

200 **The Committee stressed** the demand among scientists for improved access to data, which will increase with the development of ocean monitoring systems, and **welcomed** the work being done on the JGOFS data management system by Dr. G. Flierl, MIT, USA, and on new IODE data systems to make data available easily and rapidly, with quality control when pertinent.

10.3 INTEGRATED GLOBAL OCEAN SERVICES SYSTEM (IGOSS)

201 Dr. C. Berman, the IGOSS Operations Co-ordinator, presented a brief overview of the Integrated Global Ocean Services System which was accompanied by a graphic containing the salient points. He pointed out that IGOSS was an example of a long-term effort involving close co-operation between the Intergovernmental Oceanographic Commission (IOC) and the World Meteorological Organization (WMO).

202 Definitions were provided for "real time" and "near-real time" data to give the participants an idea of the framework within which IGOSS data collection, transmission and processing, as well as product preparation and dissemination operate.

203 The function of the IGOSS Observing System (IOS) which collects data from the Ship-of-Opportunity Network (merchant ships, fishing vessels, naval vessels, and research ships), drifting and moored buoys, coastal stations and offshore platforms, and aircraft was described. The IGOSS Data processing Services System (IDPSS) consisting of National, Specialized, and World Oceanographic Data Centres was further described as well as to the IGOSS Telecommunications Arrangement (ITA) which facilitates the global transmission of oceanographic data over the Global Telecommunctaions System of WMO.

204 Dr. Berman noted that the present emphasis of the IGOSS System was the collection, quality control, and archiving of sea surface and upper ocean temperature and salinity data, much of which are collected using expendable bathythermographs (XBTs). Data involving along-the-track measurements (surface salinity, temperature, and surface currents) are also being collected and processed although not in as great a volume as the other parameters mentioned.
Future programme needs, however, may require that information on items such as species type and composition (for harmful algal blooms) or chlorophyll concentrations (productivity) be transmitted in real or near-real time over the GTS for oceanographic community users with various operational and research needs. The continuing of flexible coding systems for the transmission of these data is an ongoing activity of IGOSS expert groups.

205 **The Committee took note** of the information provided.

10.4 GLOBAL OCEAN OBSERVING SYSTEMS

206 Dr. A. Tolkachev reported on the activities of IOC aimed at the development of the Global Ocean Observing System (GOOS) jointly with WMO, and of the Long-Term Global Monitoring System of Coastal

and Near-Shore Phenomena Related to Climate Change jointly with UNEP and WMO.

207 The development of these systems was undertaken in response to Resolution XV-4 of the Fifteenth Session of the IOC Assembly and of recommendations of the WMO-UNEP Intergovernmental Panel on Climate Change and of the Second World Climate Conference.

208 The attention of the Committee was drawn to the Summary Report of the meeting of the IOC ad hoc Group of Experts on a Global Ocean Observing System (Washington, DC, USA, 6-7 September 1990) (Document IOC/INF-829) and to the document entitled "Toward a Global Ocean Observing System: A Strategy" (Document IOC-XVI/8 Annex 3) prepared by the ad hoc Group, which provides a strategy and rationale for the GOOS. GOOS will be designed and planned as a component of a Global Climate Observing System and as a part of a global system for monitoring and predicting climate and environmental changes.

209 UNEP, IOC and WMO have developed a proposal for a long-term monitoring system of coastal and near-shore phenomena related to climate change. The proposal has been prepared by the joint UNEP-IOC-WMO meeting of experts which met in Paris, 10-14 December 1990 (Document UNEP-IOC-WMO/GCNSMS-I/3). This system will be planned and developed as a part of, and complement to, the Global Ocean Observing System, the United Nations system-wide Earthwatch and the Global Climate Observing System. The goal of the proposed system is to contribute to:

(i) the global, regional and national efforts to assess climate change and the environmental and socio-economic impacts of this change, and

(ii) the development measures designed to mitigate the undesirable effects of the expected impacts.

210 The system is planned to be implemented in phases, starting with a pilot phase which will only include a few variables and observations on a limited number of sites.

211 The proposed systems will have many linkages and will support and be supported by on-going and planned ocean-observing systems (IGOSS, GLOSS, DBCP, WWW) and large-scale research programmes (TOGA, WOCE, GEWEX, JGOFS, IGBP, etc.). The requirements for long-term systematic ocean observations are being addressed by the CCCO/JSC Ocean Observing System Development Panel, which will complete its work in December 1994.

212 The proposals on GOOS and GCNSMS (Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change) will be submitted to the Sixteenth Session of the IOC Assembly for approval and provision of guidance on further actions regarding preparations of plans for GOOS and the pilot phase of GCNSMS, and required co-ordination mechanisms. They will be also submitted to UNEP and WMO governing bodies for approval.

213 Dr. Tolkachev pointed out that close linkage should be established with the activities of GIPME in planning the proposed systems and recommending methods and sites for monitoring of some variables, particularly related to marine chemistry and marine pollution. The Committee was also invited to contribute to the next issue of the status report on ocean-observing systems, particularly with regard to marine pollution monitoring.

214 **The Committee noted that careful study of these proposals will be needed and recommended that the GIPME Groups of Experts should be actively involved in the design and planning of the proposed ocean monitoring systems, and in particular GEMSI and GEEP should be involved. The Committee requested the Secretariat to send the relevant documents to GEMSI and GEEP members for review and comments.**

10.5 IOC COASTAL OCEANOGRAPHY INITIATIVE

215 This Agenda item was introduced by Mr Y. Jiang. The issue of Coastal Ocean Circulation Dynamics and Fluxes was initially discussed by an Experts Consultation in UNESCO headquarters, Paris, 4-7 January 1989. A proposal on an International Programme for the Dynamics and Oceanography of Coastal and Shelf Seas and Exchanges: Rational and Elements was prepared and submitted to the Third Session of the IOC Technical COmmittee on Ocean Processes and Climate (Paris, 27-29 June 1989) and the Fifteenth Session of the IOC Assembly (Paris, 4-19 July 1989). The Assembly endorsed the proposal through Resolution IOC-XV.3.

216 The COCDYF Programme Plan provides an international framework within which national and regional programmes and projects may be coordinated and synthesized to contribute to an understanding of fundamental properties and variabilities of the transition zone from the land to the open sea on a global basis.

217 The purposes of this programme are: to strengthen communication among the global ocean science communities, to foster co-operation, collaboration and technology transfer, and to evaluate, assess and synthesize knowledge in this field. The elements of the programme which reflect these purposes include communication via workshops and seminars; training via courses and visits, and the publication of a newsletter, manuals and treatises, the maintenance of guidance via a Group of Experts.

218 The overall goal of this programme is to encourage and facilitate coastal and shelf ocean sciences and technology on a global basis in order to promote the enhancement of capabilities to carry out such studies, to increase scientific understanding, and to provide scientific inputs to an effective coastal zone management. The elements of the programme may include the communication via workshops and seminars, training via courses and visits,and the publication of a newsletter, manuals and treatises, the maintenance of guidance via a Group of Experts.

219 Programme activities will initially focus on the physical, dynamical studies, with a view of linking these study results to other interdisciplinary processes.

220 **The Committee took note of the information provided.**

10.6 OCEAN SCIENCES IN RELATION TO LIVING RESOURCES (OSLR)

221 Dr. T. Osborn introduced this Agenda item, describing the structure of the OSLR programme with its three sub-programmes: International Recruitment Project (IREP), Harmful Algal Blooms (HAB) and Ecosystem Dynamics in relation to Living Resources (EDLR), the two last having the greatest potential interaction with GIPME.

222 The priority for the HAB programme would be the interfacing between the already multidisciplinary scientific community and the managerial/fisheries community. The programme hopes to increase the interaction between the strong, high-quality scientific community and the appropriate managers who need assistance in coping with harmful blooms and their effects. This is a truly multidisiplinary problem: biology, ecology taxonomy, chemistry, physics, fisheries, health, political and financial. There will be strong interactions with GIPME. In this context, development of methodologies and appropriate reference materials would be of prime importance.

223 The EDLR will seek to tie together present knowledge of primary productivity, such as established through e.g. JGOFS, and fisheries dynamics, through addressing variability of secondary production and its relationship with primary production.

224 The Representative of IAEA mentioned that a Reference Method for the assessment of marine toxins was in the process of being prepared.

225 **The Committee expressed its appreciation** of the information provided.

226 With regard to this entire Agenda item, the ICES Observer also noted that a number of presentations had been made regarding the design and implementation of new monitoring programmes and that GEMSI's attention had been drawn to the need to develop *in situ* methods for measuring environmental contaminants. In these contexts, he expressed concern that there seemed to be inadequate specification of the objectives of the monitoring progrmmes for which new methods development was required. On a number of occasions, ICES, in its advice to the European marine environmental protection commissions and its participation in the North Sea Task Force, has placed considerable stress on the need for clear statements of objective and, preferably, the formulation of testable hypotheses, with which to judge the methodological requirements of such programmes.

227 The ICES Observer urged those outlining requirements and logistical designs of monitoring programmes to ensure that such clear statements of programme objectives are provided in order to permit a more detailed appreciation of the methodological and quality assurance requirements of such programmes.

228 **The Committee took note** of the ICES observer's comments.

229 **The Committee adopted** Recommendation GIPME-VII.8.

11. INTEGRATED RESOURCE REQUIREMENTS FOR THE GIPME PROGRAMME

230 The Chairman introduced this Agenda Item. He referred to Document IOC/GIPME-VI.7 "Draft Action Plan for GIPME" and to the reports of the two ad hoc Groups on the Action Plan for GIPME and on MARPOLMON presented and discussed under Agenda Item 9.7.

231 **The Committee recognized** that considerable resources were required for the implementation of the Second GIPME Action Plan and of the MARPOLMON System, and that extrabudgetary resources would need to be identified.

232 **The Committee recommended** that Member States and other organizations and bodies be urged to extend their efforts in identifying, allocating and offering resources, human, financial and material (ships, instruments, etc.) and thus contribute as far as possible to the implementation of the Second GIPME Action Plan.

12. ELECTION OF OFFICERS

233 Pursuant to the IOC Guidelines for the Structure and Responsibilities of IOC Subsidiary Bodies (IOC Manual, Part I, Section 5.2.3), the Committee was requested to elect a Chairman and a Vice-Chairman. The Technical Secretary accordingly invited nominations for the Chairman. The Delegate of Germany nominated Dr. Neil Andersen for re-election to one additional term of office. **The Committee, recognizing** the exceptional services to the Commission and GIPME during Dr. N. Andersen's two terms of office, **re-elected** him as Chairman with acclamation.

234 The Technical Secretary then invited nominations for the Vice-Chairman.

235 The Delegate of the United Kingdom nominated Dr. J.M. Bewers for election as Vice-Chairman. **The Committee elected** Dr. J.M. Bewers of Canada as Vice-Chairman for the next term with acclamation.

13. DATE AND PLACE OF NEXT SESSION

236 Following a proposal by the Chairman, the Committee decided that the next Session should be held in 1993, so that the results of UNCED will be reflected upon.

237 The Chairman invited suggestions for a venue for the next Session.

238 The Delegate of Canada proposed to hold the next Session in a developing country.

239 The Committee endorsed this proposal and requested the Secretariat to explore this possibility.

240 Dr. L. Mee proposed that the next Session be held in Kingston (Jamaica).

241 The Committee concurred with the proposal, subject to an invitation by Jamaica.

14. ADOPTION OF THE SUMMARY REPORT

242 The Committee adopted the Draft Summary Report and Recommendations of the Session, including the Annexes, during the Session.

243 The Committee agreed that the Secretary of IOC should retain the usual editorial freedom to prepare the final version.

15. CLOSURE

244 The Chairman closed the Session at 12.30 hours, on Friday, 25 January 1991.

ANNEX I

AGENDA

1. OPENING

2. ADMINISTRATIVE ARRANGEMENTS

   2.1 ADOPTION OF THE AGENDA
   2.2 DESIGNATION OF RAPPORTEUR(S)
   2.3 CONDUCT OF SESSION, TIMETABLE AND DOCUMENTATION

3. GIPME SCIENTIFIC SYMPOSIA: A REASSESSMENT

4. INTERSESSIONAL ACTIVITIES

5. GLOBAL INVESTIGATION OF POLLUTION IN THE MARINE ENVIRONMENT (GIPME) AND THE MARINE POLLUTION MONITORING SYSTEM (MARPOLMON)

   5.1 GLOBAL ACTIVITIES
   5.2 REGIONAL ACTIVITIES

      5.2.1 IOCARIBE
      5.2.2 Mediterranean
      5.2.3 WESTPAC
      5.2.4 South West Atlantic
      5.2.5 South East Pacific
      5.2.6 IOCINCWIO
      5.2.7 IOCINDIO
      5.2.8 IOCEA
      5.2.9 Southern Ocean
      5.2.10 UNEP/IOC Action Plan for the Black Sea

   5.3 PRESENT AND FUTURE NEEDS OF REGIONAL ACTIVITIES

6. GIPME AND GLOBAL CHANGE PROGRAMMES

   6.1 JOINT GLOBAL OCEAN FLUX STUDY (JGOFS)
   6.2 OTHERS

7. GIPME CONTRIBUTION TO THE 1992 UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

8. CO-OPERATION AND CO-ORDINATION WITH OTHER BODIES AND PROGRAMMES

   8.1 CO-SPONSORING BODIES AND PROGRAMMES

      8.1.1 International Atomic Energy Agency (IAEA)
      8.1.2 International Maritime Organization (IMO)
      8.1.3 United Nations Environment Programme (UNEP)

   8.2 NON-CO-SPONSORING BODIES AND PROGRAMMES

      8.2.1 International Council for the Exploration of the Sea (ICES)
      8.2.2 Other Bodies and Programmes

9. FUTURE INTERSESSIONAL ACTIVITIES AND UPDATED GIPME ACTION PLAN

   9.1 GROUP OF EXPERTS ON METHODS, STANDARDS AND INTERCALIBRATION (GEMSI)
   9.2 GROUP OF EXPERTS ON EFFECTS OF POLLUTANTS (GEEP)
   9.3 GROUP OF EXPERTS ON STANDARDS AND REFERENCE MATERIALS (GESREM)
   9.4 OPEN-OCEAN BASELINE STUDY
   9.5 INTERNATIONAL MUSSELWATCH PROGRAMME

ANNEX II

RECOMMENDATIONS

Recommendation Number	Agenda Item	Title
GIPME-VII.1	3	Scientific Symposia
GIPME-VII.2	6.1	GIPME Interactions with the Joint Global Ocean Flux Study
GIPME-VII.3	7	GIPME Contribution to the 1992 United Nations Conference on Environment and Development
GIPME-VII.4	8.2.1	Co-operation with the International Council for the Exploration of the Sea
GIPME-VII.5	9.3	Group of Experts on Standards and Reference Materials (GESREM)
GIPME-VII.6	9.7	The Second GIPME Action Plan
GIPME-VII.7	9.7	Future Development of GIPME and MARPOLMON
GIPME-VII.8	10	GIPME Interactions with other IOC Programmes

Recommendation GIPME-VII.1

SCIENTIFIC SYMPOSIA

The Committee for the Global Investigation of Pollution in the Marine Environment,

Noting the success of the IOC GIPME Symposium on Status and Trends in the Development of the GIPME Programme,Paris, 22-24 September 1986 and the Joint GEEP-GEMSI Meeting, Moscow, 15-19 October 1990,

Realizing the importance of establishing a continuing mechanism for a dialogue between participants in the different components of the GIPME Programme, and the participants in regional marine pollution research and monitoring programmes from different regions,

Considering that such a mechanism can serve as a means of evaluating Programme activities, a forum for the elucidation of outstanding scientific issues on GIPME, and a potential mechanism for introducing and facilitating developing country involvement in certain elements of global change initiatives,

Recommends that the Officers of the GIPME Programme, in consultation with the Secretary IOC, continue to give consideration to convening similar seminars and joint meetings, as appropriate, possibly prior to future meetings of the GIPME bodies in cases where the nature and complexity of scientific and technical issues warrants it, and, in particular, in the regions comprising the MARPOLMON infrastructure.

Recommendation GIPME-VII.2

GIPME INTERACTIONS WITH THE JOINT GLOBAL OCEAN FLUX STUDY (JGOFS)

The Committee for the Global Investigation of Pollution in the Marine Environment,

Noting the Resolution IOC-XV.6 of the Fifteenth Session of the Assembly on IOC involvement in the International Geosphere-Biosphere Programme (IGBP) and the discussion on JGOFS at the Assembly,

Noting the functional mechanism established by IOC through GIPME in becoming associated with JGOFS,

Stressing the importance of regional infrastructures being in place, not only to assist climate and global change research programmes in gathering environmental data, but also to continue monitoring activities as the basic science components of these Programmes wind down,

Welcoming the present plans, within the GIPME Programme, to assist SCOR in the implementation of the JGOFS Process Study in the Indian Ocean, as well as with more general aspects such as with regard to the establishment of methodological protocols,

Recommends the Secretary IOC to give this initiative high priority and identify the necessary funds to allow for the necessary action to be initiated to reach the above goals;

Further recommends the Secretary IOC to make arrangements for convening, as appropriate, ad hoc consultations under the chairmanship of the Chairman of GIPME to specifically identify where IOC is further prepared to assist SCOR in the implementation of JGOFS.

Recommendation GIPME-VII.3

GIPME CONTRIBUTION TO THE 1992 UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT (UNCED)

The Committee for the Global Investigation of Pollution in the Marine Environment,

Noting the plans for convening a United Nations Conference on Environment and Development in 1992,

Recognizing the importance of having a well prepared input to this Conference by IOC on marine environment concerns,

Noting Resolution EC-XXIII.3 which instructs the Secretary to initiate actions, as soon as possible, to ensure that a significant IOC contribution will be made to the Conference,

Noting also the work already in progress and the noticeable involvement of the IOC in process,

Noting further the preparation of a strategy document jointly with UNEP,

Recommends the Secretary to give very high priority to ensure that the interests of GIPME are reflected and articulated in the preparation of IOC's contribution to UNCED.

Recommendation GIPME-VII.4

CO-OPERATION WITH THE INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA (ICES)

The Committee for the Global Investigation of Pollution in the Marine Environment,

Recognizing the mutual benefits previously obtained through the close co-operation between IOC and ICES, and

Noting the potential advantages of continued co-operation of this kind in respect to the scientific elements of marine environmental assessment and protection,

Recommends that IOC foster and maintain such co-operation with ICES in marine environmental science, including inter alia methodological development, intercalibration, reference material preparation, development of biological effects measurement techniques and evaluation and standardization, and the assessment of effects and risks to human health and marine ecosystems of contamination in the marine environment.

Recommendation GIPME-VII.5

GROUP OF EXPERTS ON STANDARDS AND REFERENCE MATERIALS (GESREM)

The Committee for the Global Investigation of Pollution in the Marine Environment,

Noting the progress made by the Group of Experts on Standards and Reference Materials (GESREM) since its formation at the Sixth Session of the Committee,

Noting also the need to strengthen the use of reference materials in marine pollution monitoring programmes,

Considering that the Quality Control Programmes which now form an integral part of marine pollution monitoring programmes should make full use of standards and reference materials,

Decides that the mandate of the Group be enlarged to include the following item as part of its Terms of Reference:

> Provide advice on those aspects of Quality Control which require the preparation and use of certified and other reference materials;

Recommends that within this item GESREM give consideration to the following aspects:

(i) the formulation of guidelines for the preparation and use of reference materials and their application to quality control charts;

(ii) the design of programmes for encouraging the effective use of certified and other reference materials in regional and global monitoring projects; and

(iii) the provision of direct support, where possible, in the production of reference materials.

Recommendation GIPME-VII.6

THE SECOND GIPME ACTION PLAN

The Committee for the Global Investigation of Pollution in the Marine Environment,

Noting that new concerns on climate and global change as well as marine and coastal environmental problems have to be addressed in the near and mid-term by the GIPME programme,

Recognizing that very considerable resources are required in order to make possible the smooth implementation of the Second GIPME Action Plan,

Accepts the revised Action Plan for GIPME which addresses all aspects of the Programme,

Recommends to the sponsoring Agencies IOC, UNEP, IAEA and IMO to co-ordinate the best possible use of resources for the smooth implementation of the second GIPME Action Plan.

Recommends that Member States and other organizations and bodies be urged to extend their efforts for identification of resources and through a co-ordinated allocation or offer of resources, human, financial, and material (ships, instruments, etc.) contribute, as far as possible, to the implementation of the Second GIPME Action Plan.

Recommendation GIPME-VII.7

FUTURE DEVELOPMENT OF GIPME AND MARPOLMON

The Committee for the Global Investigation of Pollution in the Marine Environment,

Recognizing that the sources, nature and impact of marine pollution often vary within and between geographical regions and are gradually changing with time,

Being aware that in MARPOLMON the identification of regional priorities and concerns should be a prerequisite for designing programmes for the assessment of marine pollution,

Considering that the general perception of marine pollution and its importance in broader issues of coastal zone and ocean space management is improving,

Taking into account that regional 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, specialist supplies and instrumentation) and follow-up support in order to generate applicable and comparable data,

Conscious of the present constraints imposed upon MARPOLMON'S regional monitoring programmes as a consequence of limitations in financial support and the availability of human resources,

Understanding the periodic need to review and, where appropriate, modify the objectives of existing programmes constituting MARPOLMON for monitoring and assessing marine pollution,

Recommends the Secretary IOC to undertake, in consultation with the GIPME Officers, an urgent review of the operational elements of GIPME'S MARPOLMON to assess priorities for future programme element formulation and execution in the light of changing perspectives on marine pollution issues and the joint sponsorship of GIPME by UNEP and IOC.

Recommendation GIPME-VII.8

GIPME INTERACTIONS WITH OTHER IOC PROGRAMMES

The Committee for the Global Investigation of Pollution in the Marine Environment,

Noting the development of several new initiatives within IOC, inter alia the Global Ocean Observing Systems, Coastal Oceanography and Shelf Dynamics, the Harmful Algal Bloom, as part of OSLR,

Recognizing that these activities are inherently of a multi-disciplinary nature,

Considering that there is mutual benefit to be gained in all these initiatives in incorporating GIPME interests and expertise in programme development and implementation,

Recommends the Secretary IOC to ensure GIPME technical representation in these emerging IOC initiatives to ensure the noted mutual benefits are realized;

Further recommends that appropriate representation of these programme components also be provided in the GIPME Groups of Experts meetings to ensure lines of communication be maintained.

ANNEX III

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ANNEX IV

DRAFT SECOND ACTION PLAN FOR GIPME - GLOBAL INVESTIGATION OF POLLUTION IN THE MARINE ENVIRONMENT

1. INTRODUCTION

What follows is a draft GIPME Action Plan for the next intersessional period (1991-1993). In developing this plan, information was used from the various reports and documents produced by the three Groups of Experts and the plan has been developed as possible action items for each Group. New concerns on climate and global change as well as "new contaminant" concerns are reflected in this plan. The timing for the activities is based on the present knowledge of the operation of the Groups. Where possible, budget forecasts in thousands of US dollars are provided.

It should be noted that the cost of these activities are not specifically assigned to IOC and the Committee recognizes the significant cost-share that will have to be found from other agencies and programmes. The cost of many past activities have been shared by outside agencies and governments. It was felt that it is essential to reflect the actual cost of these activities in order to recognize the donations and importance of these other agencies to the programme.

The estimated total cost is given and the funds requested from IOC as cost to IOC. The priority assigned by the Committee to each activity is by letters A or B. A: High priority, essential in the advancement towards GIPME objectives. B: Medium priority, but likely to increase in priority as the programme develops.

Below a short description is given of each activity. Further details can be obtained from the reports of each individual expert group and these are available from the Secretariat.

1.1 THE DRAFT ACTION PLAN FOR GIPME IS PRESENTED IN FOUR SEGMENTS:

(i) Committee for GIPME activities including GIPME Officers activities;

(ii) Group of Experts on Methods, Standards and Intercalibration (GEMSI);

(iii) Group of Experts on the Effects of Pollutants (GEEP); and

(iv) Group of Experts on Standards and Reference Materials (GESREM).

In addition to this comes the various TEMA components on global and regional levels identified through the TEMA Action Plan and through the regional subsidiary bodies, much of the co-operation with UNEP in the framework of GIPME, and preparation for UNCED.

1.2 COMMITTEE SESSION

The Eighth Session of the Committee for GIPME, is planned for 1993; venue to be determined.

Resources required: US$ 20,000. Priority A
Cost to IOC: US$ 10,000.

1.3 GIPME OFFICERS

Travel and subsistence (and possibly contracts) for GIPME Officers to conduct intersessional activities with regard to direct GIPME tasks as well as interaction/co-ordination with other IOC Programmes, Global Climate Change Initiatives, other UN Agencies, NGO Programmes, and UNCED.

Resources required: US$ 15,000 per year. Priority A
Cost to IOC: US$ 15,000

2. GROUP OF EXPERTS ON METHODS, STANDARDS AND INTERCALIBRATION (GEMSI)

2.1 EVALUATION OF THE EFFECTIVENESS OF PAST GEMSI TRAINING AND INTERCOMPARISON EXERCISES

It is obvious that there is now enough data to be able to evaluate the successes and failures of the past 10 years' activities and to make recommendations for the future. This will be initiated by correspondence with GIPME Officers and followed by an *ad hoc* group meeting of GEMSI Members to make this evaluation and frame recommendations.

Resources required: US$ 10,000. Priority A
Cost to IOC: US$ 5,000

2.2 OPEN OCEAN BASELINE

The open ocean baseline effort appears to have been operationally very successful. However, until the data are analyzed and integrated it will be impossible to tell how successful. It is planned to convene a meeting in the United States to evaluate the data as well as the next phase of the baseline study. It is suggested to convene the meeting at the time of another international meeting addressing the coastal zone so as to minimize costs. (April 1991, Jeckyll Island, Georgia, USA).

Resources required: US$ 35,000. Priority A
Cost to IOC: US$ 20,000

At this time there is a possibility of Canada providing the research vessel HUDSON to carry out the next phase of the Open Ocean Baseline Study in 1992. A budget has been constructed following experiences gained in the first phase, and including sampling, extraction, and analysis of organic contaminants.

Resources required: US$ 103,000. Priority A
Cost to IOC: US$ 80,000

2.3 ORGANICS SUB-GROUP

The Organics Sub-Group has not met since GEMSI-IX. It has been recommended that the group needs to investigate the requirements of the user community rather than moving down a certain path of exotic degradation products. This group should be convened to consider new directions for GEMSI and help plan the proposed GEMSI/GEEP Workshop. It is planned to convene this meeting in the first quarter of 1992 as it is essential that this group meet after the effectiveness group and the open ocean baseline cruise.

Resources required: US$ 10,000
Cost to IOC: US$ 5,000

2.4 GEMSI/GEEP WORKSHOP

Steering committee meeting to plan a joint GEEP/GEMSI Study Group to consider a combined research/training workshop to evaluate linked chemical and biological analyses of the environmental fate and effects of non-persistent pesticides and other contaminants in the coastal zone. A proposed site of this workshop is Mazatlán, Mexico, in order to take advantage of regional resources by November 1992. It is therefore essential that this study group meet in early 1992.

Resources required: US$ 10,000 (for the Steering Committee Meeting)
Cost to IOC: US$ 6,000

Resources required: US$ 53,000 (for the Workshop). Priority A
Cost to IOC: US$ 25,000

2.5 WESTPAC WORKSHOP ON RIVER INPUT OF NUTRIENTS

A Workshop on River Input of Nutrients to the Marine Environment in the WESTPAC region is planned to be held in 1991 or 1992 in Kuala Lumpur or Bangkok. The main objective of the Workshop is to bring together scientists from the region to compare and evaluate existing information on river inputs of nutrients, identify gaps in understanding and develop co-ordinated programmes/studies to address these gaps.

Resources required: US$ 25,000. Priority A
Cost to IOC: US$ 15,000

2.6 IOCINDIO WORKSHOP

A Workshop is planned to be held at NIO, Goa, India in 1991 as part of the Pollution Monitoring Research Control and Prevention Programme for the Coastal and Marine Environment in the Indian Ocean Region. This is a part of a programme under consideration for funding by DANIDA and IOC, to assist in development in the IOCINDIO Region. Assistance from GEMSI was requested in the design of some aspects of the Workshop. However, April 1991 gave too short a lead time to permit significant input, i.e. assistance with training in trace metals and selected organic contaminants in sediments. Standards and reference materials (nutrients, trace metals and selected organics) would be required in advance.

Resources required: not identified. Priority A
Cost to IOC: US$ 15,000

2.7 MASS BALANCES

At the last GEMSI meeting it was concluded that the philosophy inherent in the mass-balance approach underlies the design of all recent and future GEMSI activities. Accordingly, as a complement to earlier work on the improvement of measurements of contaminants in the marine environment, recent and planned workshops emphasize either inputs (e.g. river fluxes) or removal pathways (sediments) for monitoring and assessment purposes. These various foci are required for both the implementation of the GIPME Programme, which stresses mass-balance construction as a valuable component of contamination assessment, and the UNEP Regional Seas Programme. The recent stress on boundary fluxes within GEMSI activities reflects the conclusions and recommendations of IOC Technical Report No. 25. In recognition of the above GEMSI will:

(i) Continue work on atmospheric measurements of contaminants and calculation of fluxes.

(ii) Provide input to the Global Ocean Flux measurements as requested.

(iii) Continue Open Ocean Baseline.

Cost: Included in other activities. Priority A

2.8 GEEP/GEMSI WORKSHOP

Planning meeting to design, with GEEP, a workshop to assess sediment quality criteria and bioavailability of contaminants in a contaminated coastal area, taking into account the results of the ICES Study Group on bioavailability and sediment quality and the GEMSI Workshop on the use of sediments in marine pollution monitoring, Dalian, China, April 1990.

Resources required: US$ 10,000. Priority B
Cost to IOC: US$ 5,000

Implementation of the Joint GEEP-GEMSI Workshop on the applicability of sediment quality criteria and of bioavailability in a metal-contaminated coastal zone possibly in Chile in 1993.

Resources required: US$ 50,000. Priority B
Cost to IOC: US$ 20,000

2.9 GEMSI MANUAL PREPARATIONS

Manual reviews and production as required in relation to implementation of the Joint IAEA-IOC-UNEP Programme.

Resources required: US$ 5,000 - 10,000 per year. Priority A.

Priority should be given by GEMSI to completing the methodological manual on marine debris monitoring, based on the IOC-FAO-UNEP report on the results of the Mediterranean pilot monitoring project, giving due consideration to a similar manual prepared by the Marine Mammal Commission.

2.10 GEMSI SESSION

The Tenth Session of GEMSI is planned to be convened in 1992 or early in 1993.

Resources required: US$ 25,000. Priority A
Cost to IOC: US$ 15,000

3. GROUP OF EXPERTS ON EFFECTS OF POLLUTANTS (GEEP)

3.2 RESEARCH

A discussion meeting will be held at Bellagio, Italy, March 1991, in order to:

(i) identify priority areas for the application of biological effects procedures in regional scale monitoring and research programmes;

(ii) determine how such procedures may be used to establish how pollution impacts are affecting processes and rates of biogeochemical fluxes and nutrients cycles in coastal seas;

(iii) relate such studies to other programmes which aim to understand the role of coastal seas in the processes of climate change.

Resources required: US$ 10.000. Priority A
Cost to IOC: US$ 5,000

A Joint ICES/IOC Symposium will be held in September to discuss and communicate the results of the North Sea Biological Effects Workshop held in Bremerhaven, 1990. Support is required to allow appropriate IOC representation. This will be linked with the publication of these results as a series of refereed papers in a Special Issue of the Journal Marine Ecology Progress Series. This latter requires secretarial support to the editor of the Special Issue.

Resources required: US$ 10,000. Priority A
Cost to IOC: US$ 7,000

3.3 TRAINING

GEEP plans for a research-training Workshop on biological effects in Xiamen, China, in 1992, dependent upon the satisfactory resolution of on-going discussions with the Chinese authorities.

Resources required: US$ 70,000. Priority A
Cost to IOC: US$ 30,000

A Joint FAO/IOC/UNEP Training Workshop will be held on the Statistical Analysis and Interpretation of Benthic Community Data, in Alexandria, Egypt, June 1991.

Resources required: US$ 20,000. Priority A
Cost to IOC: none in cash, only in kind

Two Joint FAO/IOC/UNEP Workshops on biological effects of pollutants are planned in the Mediterranean region. This would be a natural extension to the successful benthic community workshops held by GEEP in the Mediterranean.

For the first Workshop, to be held in Malta, September 1991, GEEP was requested for a contribution in the application of biochemical techniques.

Resources required: US$ 20,000. Priority A
Cost to IOC: US$ 2,500

The second Workshop, to be held in Nice, France, November 1992 will focus on the application of biochemical and physiological techniques in marine monitoring.

Resources required: US$ 20,000. Priority A
Cost to IOC: US$ none in cash, only in kind

A Training Workshop in Benthic Community Analyses is to be held in the Wider Caribbean and/or South-eastern Pacific (CPPS) region, as a complement to their on-going programme of training in toxicity bioassay. GEEP would give this a high priority, but plans depend on GEEP receiving an invitation from the region(s).

Resources required: US$ 15,000. Priority B
Cost to IOC: US$ 7,000

3.4 MANUALS

Three manuals currently in preparation will be completed viz: the statistical analysis and interpretation of benthic community data; the induction of mixed function oxygenase activity in marine monitoring; the scope for growth in marine bivalves. A fourth manual (tentative title: Metallothionein in Fish as an Indication of Pollution by Heavy Metals) is under discussion and arrangements will be made for its preparation. When it is completed, consideration will be given to the preparation of a new manual on the

topic of cellular and molecular techniques for the analysis of fish (and/or shellfish) disease.

Resources required: US$ 5,000 per year. Priority A.
Cost to IOC: US$ 3,000

A GEEP study group of 8-10 scientists plans to hold a 2-day Workshop in May 1991 for discussing common procedures and conditions for EROD (ethoxy resorufin O-de-ethylase, as indicator of fish hepatic mono-oxygenase activity) measurements and examining alternative procedures to ensure comparability of such methods.

Resources required: US$ 10,000. Priority A
Cost to IOC: US$ 7,000

Three person-months of effort will be devoted within the Plymouth Marine Laboratory to enhancing user capability in computer software written to support the application of advanced statistical procedures to the analysis of marine community data, in order to supply such software to users of the associated GEEP manual.

Resources required: US$ 10,000. Priority B
Cost to IOC: US$ 5,000

An Intercomparison Exercise will be mounted for scientists using the "scope for growth" technique in biological monitoring, in order to standardize procedures (based on the GEEP Manual) and ensure quality control.

Resources required: US$ 10,000. Priority B
Cost to IOC: US$ 5,000

3.5 SESSION OF GEEP

The Sixth Session of GEEP is planned to be held in 1993, the Bellagio meeting (see 3.2) being considered as an interim GEEP Session.

Resources required: US$ 25,000. Priority A
Cost to IOC: US$ 15,000

4. GROUP OF EXPERTS ON STANDARDS AND REFERENCE MATERIAL (GESREM)

4.1 PREPARATION AND CERTIFICATION OF REFERENCE MATERIALS

Two materials will be prepared from a mussel homogenate. The first will be certified for trace metals and designated GESREM-1. The Second will be certified for organochlorines and PAHs and designated GESREM-2. Funds are requested to cover costs of collection, freeze-drying, homogenizing and bottling the material. The IAEA/ILMR, NIST, and NRC-Canada will assume costs for certification. IOC and UNEP regional programmes will receive the reference materials at no cost, while NIST and NRC-Canada will market the materials to other users by their usual procedures. GESREM-2 is intended for supplying to laboratories participating in the International Musselwatch Programme.

Resources required: US$ 35,000. Priority A
Cost to IOC: US$ 10,000 in 1991 and 10,000 in 1992.

4.2 PREPARATION OF A PLAIN LANGUAGE WORKBOOK ON PROPER AND MOST EFFICIENT USE OF STANDARDS AND REFERENCE MATERIALS

A recent NIST publication provides statistically sound guidance on the use of Standards and Reference Materials in an Overall Quality Assurance and Quality Control Programme. GESREM proposes to prepare a simplified version of this publication, written in English but intended for use by scientists for whom English is the second language. Also, it will contain examples tailored to the International Mussel Watch, and regional and national sentinel organism programmes. Funds are requested to permit a qualified scientist to prepare text and examples, and also to cover graphics and preparation of publication-ready copy.

Resources required: US$ 15,000. Priority A
Cost to IOC: US$ 5,000

4.3 SECOND MEETING OF GESREM CORE GROUP

At GESREM-II, it was determined that the Core Group should meet twice prior to convening GESREM-III, to ensure that a sufficient amount of progress had ensued in implementing the GESREM Workplan. Based on expected progress, the Core Group should meet for two days during 1991, probably in Europe.

Resources required: US$ 8,000. Priority A
Cost to IOC: US$ 5,000

4.4 THIRD SESSION OF GESREM

The expectation of progress indicates that GESREM-III should occur in the first half of 1992. In order to ensure the full participation of representatives of the European Communities Bureau of Reference (BCR), the meeting is proposed to be held in Brussels.

Resources required: US$ 20,000. Priority A
Cost to IOC: US$ 10,000

4.5 GESREM PROGRESS REPORT AT BERM-V

The Chairman of GESREM, or his Representative, will present a paper on the activities of GESREM at the next Symposium on Biological and Environmental Reference Materials, scheduled for May 1992 in Julich, Germany.

Resources required: US$ 3,000. Priority B
Cost to IOC: US$ 3,000

5. REVIEW

It is envisaged that the Officers of the Committee for GIPME will together with the Secretariat review the adopted Action Plan at intervals so as to make modifications and possibly additions depending upon developments.

ANNEX V

FUTURE DEVELOPMENT OF MARPOLMON
(REPORT OF THE AD HOC GROUP ON MAPOLMON)

Following the presentation of intersessional activities within MARPOLMON, the Group considered the development of an action plan for future GIPME MARPOLMON activities within regional areas.

MARPOLMON comprises programmes addressing regional sea issues within GIPME. It excludes work not specifically directed at regional issues such as the development of methods for widespread application, preparation of reference materials and all programmes addressing open-ocean issues.

The Group first considered the context within which regional MARPOLMON programmes were conceived. It was proposed that regional issues were identified as perceived problems, as yet unquantified, for which additional studies were required in order to assess their nature and severity. Thus, the objective, inter alia, of regional programmes was to develop a level of understanding, assessment or quantification to permit the relative importance (i.e., the nature and severity of adverse effects) to be determined.

It would therefore be expected that the mixture of issues identified by different regions would differ. There may be specific issues common to all, or most, regions, while others may be peculiar to individual regional sea areas. However, there has in the past been a rather surprising degree of commonality in the primary issues identified in different regions. For example, petroleum hydrocarbon contamination has received rather more diverse attention than might be warranted when considering the nature and magnitude of potential sources of such substances. It might be questioned whether the widespread identification of petroleum hydrocarbons as a major issue of unquantified concern is due to realistic assessments of local characteristics and circumstances or is a consequence of a tendency for regions to emulate each other.

The basis for the identification of issues should be a balanced evaluation of regional conditions, sources of contaminants and the types of organisms or resources susceptible to damage or risks of damage.

It is arguable that widespread identification of common issues in numerous regions would justify greater attention to methodological development, training and measurement-making in a GIPME/MARPOLMON programme. However, this would not obviate the need for attention to other issues depending upon their relative importance within regional contexts.

Any consideration of the needs for development of regional programmes and the associated requirements for assistance in method development and application should be made in the context of specific identified needs within regions. Accordingly, the Group assessed the issues identified within the regional element of GIPME/MARPOLMON and compared these,

where possible, with the regional issues of predominant concern identified within the regional assessments carried out as part of the GESAMP study of "The State of the Marine Environment" published in 1990.

Table I summarizes environmental issues that have been assigned priority within regional marine areas. It is stressed that this is not an exhaustive presentation but lists the most important perceived issues or problems that have been identified within regional sea areas for priority attention to determine the nature and severity of those issues, to allow the associated adverse consequences to be identified and quantified and for the nature of remedial measures to be identified.

The issues presented in Table I are derived from two principal sources:

(i) the regional reviews carried out in conjunction with the GESAMP Report on the "State of the Marine Environment"; and

(ii) the report of MARPOLMON intersessional activities augmented by the views of participants in the ad hoc sub-group. The entries derived from the GESAMP reviews are listed under the titles of those reviews. Those identified under MARPOLMON are listed under the names of the regional areas commonly used within the forum of IOC/GIPME.

Where specific fora have been identified within regional areas such as examination of river inputs in WESTPAC, these are also shown. The main section of the table focusses upon the agents (chemical, biological, physical) that are the medium of adverse effects rather than either the practices that produce and disseminate these agents or the nature of the adverse effects themselves. This provides a somewhat more uniform basis for comparison among regions.

Table I shows that the most universal issues of concern are:

(i) sewage and pathogens;

(ii) erosion, turbidity and siltation; and

(iii) eutrophication.

This selection of the most ubiquitous issues matches those identified as the most important and widespread problems by GESAMP on a global bases in "The State of the Marine Environment". The Group first examined the extent to which the methodologies, advice and capability existed within MARPOLMON to tackle these issues (i.e., to quantify the extent of sources, incidence and adverse effects of these substances).

1.a Sewage

Simple assessments are possible without acquiring environmental data. Methods for the assessment of sewage derived bacteria exist but none of these has been selected for widespread application within MARPOLMON. For this reason, there existed difficulties of intercomparability of sewage constituent distribution within and between regions.

Conclusion: GEMSI should be directed to assist UNEP/IAEA(MESL) in the selection and documentation of a single method for sewage bacteria measurement(s) that would provide a common basis for assessing the extent of sewage contamination of the near-shore marine environment.

1.b Pathogens

Methods are available for the measurement of specific pathogens contained in sewage that have human health implications. Nevertheless, there is no concrete advice within GIPME as to the approach that should be adopted in respect to assessing the presence and risks associated with pathogens discharged on sewage. Furthermore, it appears that the measurement of viruses is of increasing importance but has received little attention within a GIPME context. GEMSI should be requested to examine this topic and consult with WHO experts on steps that can be taken to improve attention to pathogens within GIPME.

2. Erosion/Turbidity/Siltation

Methods for assessing the nature and severity of problems associated with the introduction and mobilization of suspended particulate matter already exist within GIPME. In the main, regions have adopted a method for measuring suspended matter within MARPOLMON. It is, however, surprising that no reference manual providing methodology and guidance for application within MARPOLMON exists and this situation should be rectified.

3. Eutrophication

Assessment of eutrophication problems is complex in that it involves not only attention to nutrients but also phytoplankton diversity, the relationship between physical and chemical conditions and production, particulate organic carbon fixation and regeneration, ventilation and oxidation/reduction chemistry. There also exists a potential linkage to red tides and phytotoxin production that relates the subject directly to the question of "harmful algal blooms".

Within GIPME, methodology and guidance exist with regard to the measurement of nutrients in sea water. Some re-examination of this guidance would be justified to ensure that reduced forms of nutrients are given appropriate attention. This should be done in conjunction with the reconsideration of the need to produce a reference manual for nutrients in the context of OCA/PAC and MARPOLMON applications.

The fact that the issue of "Harmful Algal Blooms" is being perceived as warranting much increased attention (within OSLR for example) suggests that GEMSI, and perhaps GEEP, should make an effort to ensure this entire question as an urgent basis to determine what can be done to determine relationships between coastal physical and biological conditions and the response of phytoplankton communities. This is a scientific issue of some complexity and considerable importance but one that should be inherently tractable given the contemporary scientific capabilities.

Table I

MARPOLMON Issues and Foci by Region

ISSUES AND FOCI	REGIONS																
	Caribbean	SW Atlantic	Central E Atl.	North Sea	W&C African	Baltic	Mediterranean	E African	ROPME SEA AREA	S Asian Seas	C Indian Ocean	N&C W Indian	W Pacific	E Asian Seas	South Pacific	SE Pacific	BLACK SEA
ISSUES																	
Hydrocarbons	*	*	*		#			#[1]	#		*			#[1]			*
Litter/Marine debris	*		*	*	#		*			#	*	*				*	
Heavy metals		*								#			*		#	*	#
Pesticides	*	*	*	*		*					*	*	*			*	#
Erosion/Turbidity/ Siltation	*		*		#		*	#		#	*	*		#	#	*	*
Eutrophication		*		*	#	*	*		#	#	*	*		#	#	*	#
Sewage/Pathogens[2]	*	*	*		#		#	#		#	*	*	*	#	#	*	#
Runoff modification								#									#
Contaminants in seafood[2]							#	#									
Sea level change	*		*	*			*	#			*	*			#		
FOCI																	
Physical modifications of the environment																	
Atmospheric Inputs				*		*	*										
River Inputs										*			*				#

Attachment to Table I

Regions

Carribbean	*
Southwest Atlantic	*
Central and Eastern Atlantic	*
North Sea	*
West and Central African Region	#
Baltic	*
Mediterranean	*/#
Eastern African Region	#
The ROPME Sea Area	#
South Asian Seas	#
Central Indian Ocean	*
North and Central West Indian Region	*
Western Pacific	*
East Asian Seas	#
South Pacific	#
Southeast Pacific	*
Black Sea	*/#

Key to Table I

(1) Referred to in the context of spills of oil through misadventure rather than routine releases or widespread contamination.

(2) Specifically refers to human health aspects of the issue.

* Designated within MARPOLMON

\# Identified in regional assessments conducted for the preparation of GESAMP Report on the State of the Marine Environment

The remaining issues, depicted in Table 1, can be listed in order from those for which concerns are widespread among regional sea areas to those that appear to be only of primary interest in a small number of regions. Each of these issues is discussed below in this order of presentation.

4. Pesticides

The methodology for measuring pesticides in regional marine areas already exists and appropriate guidance is provided by the reference manuals produced jointly by UNEP, IAEA and IOC. However, it is appreciated that the capital and maintenance costs of analytical equipment are substantial and this has had the effect of limiting attention to pesticides in some areas. One deficiency in attention to pesticides has been tailoring of measurements to the individual pesticides used in individual regions. This, in turn, suggests that not enough attention has been given to assessing the types and volumes of use of pesticides within regional areas and using this assessment for optimizing attention to a reduced and appropriate selection of pesticides in individual areas.

5. Litter/Marine Debris

Methodology for quantifying and determining the sources of beach litter, including tar balls, exists and has been described in reference manuals. This methodology is cheap and easy to implement and provides an intercomparable basis for evaluating marine debris. Accordingly, the results of beach litter surveys provide a rapid basis for small and large scale intercomparisons among different areas and is well suited to State of the Environment reporting.

The potential effort offered by such surveys of litter is adequately demonstrated by the results of the pilot survey of persistent synthetic materials contained in the report of an IOC-FAO-UNEP review meeting held in Haifa, Israel, in June 1989. It is somewhat puzzling why these surveys have not been conducted on a widespread basis as a simple and effective technique for assessing its nature and sources of marine contamination by litter. This lack of application needs to be rectified and this applies equally to both developed and developing regions of the world.

There is a need to re-examine, in the light of experience, the effectiveness of procedures for normalizing the distributions of litter resulting from these beach surveys in order to obtain a balanced appreciation of the severity of this problem over small and large space scales. This could be done by GEMSI but presents no barrier to the implementation of beach surveys, merely an opportunity to enhance their utility.

6. Hydrocarbons

There has been considerable attention to assessing the incidence of dissolved/dispersed hydrocarbons in order to assess the severity of contamination and pollution of regional sea areas. Early perceptions that chronic low-level contamination by petroleum hydrocarbons have a major impact on marine resources and amenities now seem to have been allayed as reflected in the GESAMP review of "The State of the Marine Environment". Regional

concerns now seem to be focussed on episodic oil spills from tanker accidents, oil terminals and, in some small areas, the effects of periodic releases of oil during transhipment. This is entirely appropriate and reflects the improving state of knowledge of both the presence and effects of marine contaminants. It was also noted that, often, the most appropriate approach to the measurement of the presence of petroleum hydrocarbons is to measure these substances in sediments where their presence better reflects the line-averaged presence of such contaminants in areas subject to the careful selection of sedimentary regimes in which to make these measurements. The need for these measurements should be carefully assessed in the context of local conditions and assessments of the likely extent of contamination.

7. Heavy metals

The methodology for survey and monitoring of metals in the marine environment is well established and adequate guidance exists for the application and interpretation of such measurements. Furthermore, there has been wider acquisition of instruments for the measurement of trace metals than for any other class of trace chemical contaminants. Perhaps the one major question outstanding with respect to metals is that of the requirements for adequate normalization and quality assurance. This is, however, being pursued repeatedly in various fora such as ICEAS and GEMSI but, currently, is not a matter of urgent concern.

8. Other issues deserving of consideration

The Group then discussed two subjects that had been identified in its analysis of MARPOLMON programme elements. These were: (i) oil spill preparedness and contingency; and (ii) polycyclic aromatic hydrocarbons.

(i) Oil Spills/Accidents

It had been noted in the preceding discussion that hydrocarbons were predominantly an issue of concern in respect to oil spills and associated adverse effects. In question was the adequacy of current assessment and measurement techniques required for prevention and contingency planning for oil spills. In this context, the subject of oil cargo 'fingerprinting' was raised with reference to a small number of laboratories engaged in this practice that were each processing up to 20,000 samples of oil cargo per year. While these laboratories are well-intercalibrated, it would appear that the need for relevant reference materials might be assessed by GESREM in its future work.

Another aspect of environmental contamination/pollution by oil warranting examination, by GEMSI in this instance, would be used lubricating oils. In this case, it was concerned that regional and local assessments of the situation would be useful to determine whether further Expert Group work was needed.

(ii) PAHs

The observation was inescapable that it was peculiar that there were not more references to the issue of PAHs and their effects in the regional documents used for this analysis. The fact that PAHs are derived from a variety of sources, have important human health implications, have effects on animal health, and are already an issue of increasing concern regarding fisheries in certain areas of the world, suggests that they have not been assigned an appropriate priority in respect to substances like pesticides and petroleum hydrocarbons.

CONCLUSIONS

This analysis is incomplete, partly, because of limitations in the information available during this session and the limited time available to digest and analyze it. Accordingly, the first conclusion that can be drawn is that it deserves to be done thoroughly and authoritatively and extended into the evaluation of programme elements existing, or under development, within MARPOLMON regions. It is therefore recommended that GIPME make arrangements to ensure a more complete review of MARPOLMON on a similar manner to that adopted for the preparation of IOC Technical Series No. 25 in which the objectives and directions of GIPME were reviewed in the context of the Comprehensive Plan for GIPME (Technical Series No. 16). This review should not, however, be undertaken until the UNEP Governing Council has adopted the proposal to co-sponsor GIPME and some appropriate guidance for this work has been provided by UNEP OCA/PAC and the IOC Secretariat.

A number of scientific and technical issues have been preliminarily identified that deserve examination by GEMSI, GEEP and GESREM. These include:

(i) GEMSI and GEEP should consider, on a priority basis, the development of scientific studies to assess the causes, nature, extent and effects of harmful algal blooms, in co-operation with OSLR/HAB;

(ii) GEMSI should evaluate the results of pilot beach surveys of litter and marine debris and determine whether methods for data normalization are adequate, whether additional methods need to be devised and, if appropriate, document such methods for application in MARPOLMON;

(iii) GEMSI should re-examine the issue of PAHs to determine if further attention to these compounds in terms of measurement and assessment techniques is warranted;

(iv) GEMSI and GEEP should consider how greater attention can be given to pathogens in sewage for regional assessment purposes;

(v) GESREM should assess the need for reference materials in relation to the fingerprinting of oil cargos.

Finally, preliminary analysis indicates that the most universal issues for addressing within MARPOLMON are those of: erosion/turbidity/siltation; eutrophication; and sewage/pathogens. Accordingly, higher priority should be given to requirements for assessing and quantifying these potential problems within regional areas than others. Overall, the abilities, in terms of methodology and advice on sampling, analysis and interpretation for most substances is relatively well developed. There are methodological and guidance deficiencies and these are being, in most cases, attended to by the Expert Groups. Attention has been drawn already to some of these deficiencies and, no doubt, a more thorough and comprehensive analysis will reveal additional ones. However, the strength of the programme is enhanced by the expertise directly available from the Expert Groups and this should enable the MARPOLMON elements to be consistently improved to meet regional needs.