Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivale nt Bodies

IOC-NOAA Ad Hoc Consultation on Marine Biodiversity

The IOC Marine Biodiversity Strategy

Paris, 3-5 May 1995

UNESCO

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IOC-NOAA *AD HOC* CONSULTATION ON MARINE BIODIVERSITY
(Paris, 3-5 May 1995)

THE IOC MARINE BIODIVERSITY STRATEGY

1. OPENING

Dr. Kullenberg, Executive Secretary IOC, called the meeting to order at 10.00h on 3 May 1995, at IOC Headquarters, UNESCO, Paris.

He welcomed the participants and thanked the U.S. National Oceanic and Atmospheric Administration (NOAA) for its co-sponsorship of the *ad hoc* Consultation on Marine Biodiversity (hereafter called the Consultation or the Expert Consultation/Group), through financial support and the person of Dr. Crosby, NOAA Representative at the meeting. The List of Participants is given in Annex II.

He introduced the IOC as the intergovernmental mechanism of the United Nations to specifically deal with the oceans in the fields of international scientific co-operation, systematic ocean observations, services and TEMA. He referred to its association with international research programmes including WCRP and IGBP, and in particular, JGOFS, LOICZ, and GLOBEC (which could eventually become one of the IGBP core programmes); observational programmes such as GOOS, with a view to its Module on Living Resources and the Coastal Module; capacity building and other TEMA-related activities.

The Executive Secretary IOC stressed the role of IOC in transferring information to Governments on priority areas, as well as in the interpretation of scientific studies and observations.

He recalled that IOC is presently associated with one of the two important international legal instruments that were opened for signature at the United Nations Conference on Environment and Development (UNCED) (Rio de Janeiro, June 1992), namely the Framework Convention on Climate Change (FCCC), and that IOC was seeking association with the Convention on Biological Diversity (CBD). Furthermore, the Commission is also associated with the United Nations Convention on the Law of the Sea (UNCLOS).

Dr. Kullenberg said that the Consultation was mainly held to clarify to what extent existing IOC programmes and activities were relevant to the development of an IOC framework for marine biodiversity-oriented activities; and to identify a mechanism through which IOC would also contribute to CBD.

In particular, he confirmed that the Consultation was intended to provide advice to the forthcoming Eighteenth Session of the IOC Assembly (Paris, 13-27 June 1995).

The Executive Secretary IOC pointed out that IOC could be associated with the issue of marine biodiversity and with CBD, in particular through international programmes and the IOC Regional Subsidiary Bodies (IOCSOC, IOCARIBE, WESTPAC, IOCINDIO, IOCINCWIO, IOCEA and possibly other areas, e.g. the Black Sea).

He said that the Consultation was formed of regional and international experts on scientific issues relevant to the field of marine biodiversity, with possible different views on the topic. It was not, however, imperative to reach consensus on all the scientific issues, but on the other hand it was important for the Consultation to discuss and suggest priorities for IOC in this field.

Dr. Kullenberg said that an IOC programme on marine biodiversity should be developed by taking into account the needs of the IOC Member States. The CBD represents the institutional framework for it, since Governments have recognized the Convention as such.

On basis of previous consultations, the Executive Secretary IOC invited Prof. Ulf Lie (Norway) to act as the Chairman for the meeting. Prof. Lie accepted the invitation made by the Executive Secretary IOC and took the Chair.

Prof. Lie briefly delineated the historical context of the diversity concept. He recalled the ecological debate concerning identification and use of the most appropriate indices to assess species diversity. He stressed that the issue of marine biodiversity with which the Consultation will have to deal went far beyond this concept and that nowadays problems related to the destruction of habitats must be dealt with, with the subsequent reduction in terms of genetic diversity, which should be considered as part of the natural systems. He then gave the floor to the participants in order to introduce themselves.

2. ADMINISTRATIVE ARRANGEMENTS

2.1 ADOPTION OF THE AGENDA

The Chairman introduced the Provisional Agenda (Document IOC-NOAA/MBD-ad hoc/1 prov.) and the related Annotated Provisional Agenda (Document IOC-NOAA/MBD-ad hoc/2). Following some amendments, **The Expert Consultation adopted the Agenda** as given in Annex I.

2.2 DESIGNATION OF A RAPPORTEUR

It was felt that, given the limited size of the Consultation, a Rapporteur for the meeting was not needed, thus enabling the Consultation to benefit from the full participation of its Members in the discussion. The Technical Secretary would prepare the report, with inputs from the Experts on specifics.

2.3 DOCUMENTATION

Mr. Aricò, Technical Secretary for the meeting, informed the participants that the draft report of the meeting would be prepared in English. He introduced the Provisional List of Documents (Document IOC-NOAA/MBD-ad hoc/4 prov.) and presented the background documentation.

3. REVIEW OF OBJECTIVES OF THE MEETING

3.1 TERMS OF REFERENCE FOR THE IOC-NOAA *AD HOC* CONSULTATION ON MARINE BIODIVERSITY

The Chairman introduced the Draft Terms of Reference for the Consultation (Document IOC-NOAA/MBD-ad hoc/Inf. 1). **The Draft Terms of Reference**, as shown in Annex III, **were adopted**. It was emphasized and agreed that Agenda Items 3, 4 and 5 were of primary importance for the Consultation.

3.2 INSTITUTIONAL FRAMEWORK: INTRODUCTION TO THE CONVENTION ON BIOLOGICAL DIVERSITY

The Technical Secretary introduced Document IOC-NOAA/MBD-ad hoc/Inf. 2, which provides an extract of the Text of the Convention on Biological Diversity.

He briefly informed the participants of the history of the Convention on Biological Diversity. The Convention was opened for signature at UNCED in June 1992 and entered into force on 29 November 1994, on the ninetieth day after the ratification by the thirtieth country. Up to 5 April 1995, the Convention had been ratified by 117 countries.

He referred to the objectives of the Convention and the definition of the term "biological diversity", as given in Articles 1 and 2, respectively (see Annex IV).

Mr. Aricò drew the attention of the participants to the potential role that IOC can play with respect to some of the issues contained in specific Articles of the Convention on Biological Diversity, without preventing the possibility for IOC to contribute to other issues pertaining to other Articles of the Convention, through its programmes and implementing mechanisms. He referred to: Article 7 "Identification and monitoring"; Article 8 "In-situ conservation", and, in particular, its para (h), dealing with the prevention of the introduction and the eradication of alien species which threaten ecosystems, habitats or species; Article 12 "Research and training"; Article 18 "Technical and scientific cooperation", with a reference to the issue of a clearing-house mechanism for the promotion of technical and scientific cooperation; Article 25 "Subsidiary Body on Scientific, Technical and Technological Advice" (SBSTTA).

The Consultation noted that other Articles of the Convention were of relevance to IOC activities, such as Article 10 "Sustainable use of components of biological diversity"; Article 13 "Public education and awareness"; Article 17 "Exchange of information"; and, Article 21 "Financial mechanism". The Consultation agreed that in designing an IOC programme on marine biodiversity all relevant articles of the Convention should be taken into account, as appropriate.

The Technical Secretary summarized the main results of the First Meeting of the Conference of the Parties to the Convention (Nassau, Bahamas, 28 November - 9 December 1994), as reported in Document IOC-NOAA/MBD-ad hoc/Inf. 3. He then introduced Document IOC-NOAA/MBD-ad hoc/Inf. 4, giving the terms of reference of the SBSTTA to the Convention and the draft provisional agenda for its first meeting (UNESCO Headquarters, Paris, 4-8 September 1995). He drew the participants' attention to the issue contained within the 1995-97 medium-term programme of work of the Conference of the Parties to the Convention concerning the conservation and sustainable use of coastal and marine biological diversity; and the Agenda Item of SBSTTA's first meeting dealing with provision of advice on the scientific, technical and technological aspects of the conservation and sustainable use of coastal and marine biological diversity (priority item). Article 25 of the Convention on Biological Diversity dealing with SBSTTA is given in Annex IV.

The Expert Consultation took note of the information concerning the Convention on Biological Diversity, the Conference of the Parties to the Convention, its SBSTTA and other eventual subsidiary bodies, as the institutional framework within which to consider the activities of IOC with respect to marine biodiversity.

3.3 DECISIONS OF THE IOC GOVERNING BODIES CONCERNING MARINE BIODIVERSITY

The Technical Secretary introduced Document IOC-NOAA/MBD-ad hoc/Inf. 5, referring to the decisions of the Seventeenth Session of the IOC Assembly (Paris, 25 February - 11 March 1993) and the Twenty-Seventh Session of the IOC Executive Council (Paris, 5-12 July 1994) with respect to the issues of the Convention on Biological Diversity and marine biodiversity in general. In particular, he referred to the fact that at its Seventeenth Session (February-March 1993) the IOC Assembly stressed that biodiversity was an issue within the mandate of IOC; noted that the Convention on Biological Diversity was considered to be particularly relevant to tropical and sub-tropical regions; and, emphasized that GOOS was an appropriate mechanism for supporting the implementation of the Convention in a long-term perspective, especially through its Living Resource, Health of the Ocean and Coastal Zone Modules. At its Twenty-Seventh Session (July 1994) the IOC Executive Council agreed that marine biodiversity was an area of great interest to IOC, in view of the great need for research in this subject area in the interest of IOC's basic programmes. The Council confirmed the need for IOC to progressively become more involved with marine biodiversity, and stressed the important role that IOC can play in marine biodiversity-related capacity building. The Council also requested the Executive Secretary IOC to maintain contacts with the Convention on Biological Diversity and its Secretariat.

The participants took note of the decisions of the IOC Governing Bodies.

3.4 OVERVIEW OF IOC PROGRAMMES AND ACTIVITIES RELEVANT TO MARINE BIODIVERSITY

Mr. Aricò introduced Document IOC-NOAA/MBD-ad hoc/Inf. 6 on the issues of how IOC should relate to the Convention on Biological Diversity and which of the present IOC activities should be taken into account in formulating an IOC programme on marine biodiversity. The participants took note of this information, to be used in subsequent discussions.

4. DISCUSSION ON A BROAD PROGRAMME OUTLINE

4.1 BRIEF INTRODUCTION TO PRIORITY SCIENTIFIC ISSUES IN THE FIELD OF MARINE BIODIVERSITY

Each Participant gave a brief introduction to marine biodiversity and the related problems in his field of expertise. A summary of the information is given in Annex V.

4.2 DISCUSSION OF ELEMENTS AND PRIORITIES FOR AN IOC PROGRAMME

Inventories

Dr. van der Land from the Netherlands introduced the subject of inventories and actions of IOC taken so far. He stressed that there are very few places in the world where there is easy access to taxonomic tools (books, computerized tools, etc.), whereas everybody should be in a position to have free access to these tools.

He mentioned the bottom-up approach of the Expert Center for Taxonomic Identification (ETI) Amsterdam, whose main objective is to make an overview of what is available in terms of taxonomic information.

Dr. van der Land presented the UNESCO-IOC Project on a Register of Marine Organisms, initiated by IOC. The basic idea is to merge already existing lists of families coming from different sources, and make this information available in a computer format. A large amount of data are available through specific publications and products, e.g. from FAO. There are also data already available built up on an individual basis (taxonomists); sometimes there is a certain reticence on behalf of taxonomists to make their data accessible. The project is divided in two phases: the first phase, of which the first version was distributed by IOC in 1994, goes down to the family level, including the number of genera and species, as well as an experimental field on ecological information; the second phase, already started, is aimed at expanding the Register down to the species level. Many taxonomists are participating in the Project as contributors (around 400 have been contacted), and there was a very positive reaction to it. The first phase will be hopefully completed in a year's time (1996). The Register interlinks with the International Oceanographic Data and Information Exchange (IODE) Programme, and each species will be accompanied by the related US NODC taxonomic code number. The FAO nomenclature will be added as well, whenever relevant (fishes, crustaceans, etc.). The Register will be published by ETI in the form of a CD-ROM product.

The Consultation noted that the Register Project will provide a very important tool for compiling national inventories of marine fauna and flora, in particular, since it facilitates the management of collections, the process of building libraries, and the possibility of having access to and updating relevant literature on taxonomy. **The Consultation stressed** the importance of the Register in providing a common basis for the inventory process, also associated with the CBD, since it represents a model nomenclature to be recommended to Member States to make inventories. In fact, whatever inventory is developed at the national level, these inventories will be finally merged together. The Consultation gave encouragement for the product to be made available to environmental managers.

The Meeting very strongly recommended the continuation of the Register project.

The Consultation recommended that, at its next session, the IOC Assembly be asked to bring the issue of the UNESCO-IOC Project on a Register of Marine Organisms to the attention of the First Meeting of SBSTTA, possibly including a demonstration of the product.

The Consultation recommended that the Register Project be associated with the IUBS-ICSU-IUMS Species 2000 Programme. **The Consultation also stressed** the importance of further steps in the field of taxonomic tools (including computerized ones), bearing in mind that the ultimate goal should be the inventory of all known organisms. This could be achieved through linking the Register to other similar instruments, such as the ETI databases developed for specific taxonomic groups. The Register could serve as a framework for this kind of products.

The Group recommended co-operation with FAO and continued linkage with IODE.

On the general issue of inventories, **the Consultation encouraged** IOC Member States to gather existing information concerning marine fauna and flora, with a view to building up lists of species. The Group stressed the need of certain countries for training courses for the compilation of national inventories.

It was noted that there are internationally accepted rules for the taxonomic nomenclature from the family level downwards. Since there are no rules (accepted by the IUBS) for the higher groups, which causes quite some confusion, there are also many uncertainties at the species level, resulting in the use of many synonyms.

Appraisal of marine biodiversity

The Expert Consultation agreed that marine biodiversity is a subject area about which little is known. It was noted that there was no comprehensive paper or book on the subject, taking into account all the different aspects of the related scientific problems. It was pointed out that it would be inappropriate to compare the terrestrial and marine systems, since they are characterized by dynamics which are very different. For instance, the impact of the environment on the organisms in the two environments is very different, since marine organisms are much more dependent on physical conditions than terrestrial ones. A participant stressed that phenomena such as eutrophication along the coastal zones do not have an equivalent in terrestrial systems.

The Consultation urged an appraisal of the scientific problems associated with marine biodiversity, also taking into account the results of the UNEP Global Biodiversity Assessment. This appraisal should be as comprehensive as possible, including aspects related to: (i) the issue of the rehabilitation of marine biodiversity following a natural phenomenon which causes its reduction; (ii) the impact of pollution on marine biodiversity; (iii) the impact of "traumatic" fisheries (e.g. trawling).

Sustainability of marine biodiversity

The Consultation agreed on the need to assess the economic value of some representative ecosystems. It was agreed that this important issue should be considered as part of the process of bringing scientific information to the decision-making level, which would promote sustainability.

Several participants noted that the issue of sustainability might also be addressed through LME studies, the main purpose of which is the sustainable use of their components. This can be done, for example, through determining the size of LME sustainable populations, otherwise called "minimum-size" populations.

The Consultation urged the protection of marine biodiversity through: (i) a habitat protection integrative perspective; and, (ii) the protection of species, as well as from an ecological viewpoint. **The Consultation recommended** that IOC co-operate with the Man and Biosphere (MAB) Programme in this context in order to develop joint activities in the field of sustainable use and conservation of marine biodiversity.

Keystone taxonomic groups

The Expert Consultation stressed the importance of keystone taxonomic groups and species for evaluating natural and human-induced changes which affect marine biodiversity; the need for long-term monitoring of marine biodiversity was stressed, and that IOC should encourage the use of keystone/indicator species for monitoring purposes in its regional and technical programmes.

The issue of which taxonomic groups should be used in marine biodiversity studies was raised. **The Consultation recommended** that the attention focus on benthic (non-migratory) groups and that, for the study of community dynamics, priority be given to those groups which are quantitatively important. It was noted that rare species are normally not important quantitatively.

Several participants noted that the assessment of the state of diversity of marine ecosystems does not necessarily allow the assessment of the state of the health of the oceans.

The Consultation recommended that long-term monitoring programmes combine the use of indicator species and groups reflecting fundamental changes in the environment with the use of low-technology procedures, an example of which is provided by the Rapid Ecological Assessment procedure.

Deep-seas and areas beyond national jurisdiction

The Consultations recommended that IOC consider the feasibility of establishing international investigations on marine biodiversity in the deep-seas, both in the water masses and on the sea floor.

It was noted that Article 5 of the Convention on Biological Diversity specifically refers to areas beyond national jurisdiction and that IOC could play a very important role in this respect.

The Consultation expressed concern about the effects of possible future exploitation of sea-bed resources and called attention to the effects of dumping. **The Consultation recommended** that IOC keep in touch with the International Sea-Bed Authority on this matter and stressed that the scientific input which IOC will provide to the International Sea Bed Authority should also include biodiversity issues.

Training and capacity building

Training was identified as one of the priority elements of an IOC programme on marine biodiversity. The training component of the IOC programme on marine biodiversity is presented in detail in the part of the report dealing with Agenda Item 4.3.

The Consultation recommended that networks of museums and institutions dealing with scientific and reference collections be established on a regional basis. In fact, since most of these institutions are not in a position to keep comprehensive collections due to budgetary and staff shortages, they have to specialize in specific groups thus reducing their collections.

Data management

It was noted that IODE provides a valuable system for data and information management. **The Expert Consultation recommended** close association of an IOC programme on marine biodiversity with activities carried out within the context of the IODE/MIM Programme.

4.3 FURTHER ELABORATION OF THE PROGRAMME OUTLINE SECTIONS

The term "biological diversity" as used in the Convention on Biological Diversity means *"the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems (...)"*. The marine habitat, covering more than 70% of the earth's surface and extending from 0 to more than 10,000 m depth is also unique in the diversity of its living organisms. Of 33 existing phyla, 32 occur in the marine environment, and 15 phyla are exclusively marine.

The 3-dimensional nature of the ocean space and the fact that the major part of that space is beyond the reach of direct observation require a fundamentally different approach to studies of biological diversity in the marine environment than in the terrestrial one. The marine environment is also more stable than the terrestrial environment. Natural diurnal and annual fluctuations in environmental parameters are normally small and the organisms adapted to the marine environment are consequently vulnerable to relatively small perturbations of it. Furthermore, marine organisms are strongly dependent on the physical and chemical components of the environment and studies of marine species diversity must, therefore, be integrated in oceanographic studies. The extent of biodiversity reduction in the marine environment is insufficiently known, and an important first step in the development of an IOC programme should be to assess the state of marine biodiversity.

Most marine life is outside the reach of direct observation and, except for large marine mammals, there is therefore little community appreciation of the condition of marine biodiversity. Special efforts must be made to provide education at the community level on the value of marine biodiversity in sustainable utilization of marine resources, and the need for protection of coastal habitats from destruction.

The Intergovernmental Oceanographic Commission (IOC) has a special mandate *"to promote scientific investigations and related ocean services, with a view to learning more about the nature and resources of the ocean (...)"* (Article 1, part 2 of IOC Statutes), and the Commission is therefore clearly an appropriate international body to assist the Parties to the Convention in its implementation.

The Expert Consultation recommended that IOC re-evaluate its existing programmes and activities with a view to enhancing marine biodiversity as an IOC activity. Two possible options for consideration are:

(i) that IOC establish a new, separate Programme on Marine Biodiversity with its own secretariat staff and budget;

(ii) that marine biodiversity be established as a component of all relevant IOC programme activities at global and regional levels and that funding for biodiversity components be earmarked in each programme. This is particularly important for programmes concerning coastal ecosystems. Focal points for biodiversity should be established in regional subsidiary bodies and at the IOC Secretariat, and the biodiversity activities should be co-ordinated by an Advisory Biodiversity Strategy Group.

[The decision of the Eighteenth Session of the IOC Assembly (Paris, 13-27 July 1995), as reflected in Resolution XVIII-9 contained in Annex VI of this report, corresponds in actual fact to a third option, namely to continue the *ad hoc* Consultation as needed, drawing on other relevant programme activities of the IOC for the implementation of its recommendations. However, some elements of 2. (above) were retained.]

5. FORMULATION BY *AD HOC* CONSULTATION OF DRAFT PROGRAMME PROPOSAL

The Expert Consultation recommended that concern for marine biodiversity be considered in all relevant IOC programme activities. The on-going programmes of particular importance in this regard are the Ocean Science in Relation to Living Resources Programme (OSLR) and its components (the Harmful Algal Bloom Programme (HAB), the Large Marine Ecosystems Programme and the IOC contribution to GLOBEC), as well as the Global Ocean Observing System (particularly the Coastal and Living Resource Modules), the International Mussel Watch Programme, TEMA, and LOICZ. **The Consultation further recommended** that reviews of activities related to marine biodiversity be a standard agenda item of the meetings of Governing Bodies and Regional Subsidiary Bodies of the Commission.

The Expert Consultation recommended that the concept of sustainable use be considered in all IOC resource utilization and development programmes. In this regard, it is important to include a valuation of the marine biodiversity in cost-benefit analyses. The on-going IOC programmes in integrated coastal area management are important in this regard, particularly as they provide the marine science and services support for management. In addition, IOC should co-ordinate and collaborate with other appropriate UNESCO programmes, such as the Man and Biosphere Programme and the UNESCO sectors dealing with programmes that are active in integration of ecological, social and economic sciences with community involvement, in support of management for conservation and sustainable use of marine and coastal biodiversity.

The Expert Consultation considered it of major importance that Member States should endeavor to establish national biodiversity inventories.

The IOC initiative, in co-operation with the National Museum of Natural History of Leiden, Netherlands, and the Expert Center for Taxonomic Identification (ETI), Amsterdam, Netherlands, in developing a register of marine organisms (the UNESCO-IOC Register), is a very important step in this direction. The first phase of the project, the register of higher taxa down to the family level and the related overview of pertinent taxonomic literature, is near completion and will be of direct assistance to marine biologists and managers. The further development of the project must, however, be considered as an on-going exercise, eventually leading to a register down to the species level and also with tools as guidance for identification. The Register will be used as an input to a much more ambitious enterprise, the programme recently launched by the IUBS under the title "Species 2000 - Indexing the World's Known Species". This programme has approximately the same goal as the UNESCO-IOC project, but it has the objective of enumerating all known species on earth. Duplication of effort will be avoided through strong liaison.

While the UNESCO-IOC Register will be a useful tool in the future development of national inventories, **the Expert Consultation recommended** that national initiatives be taken to make lists of known species of flora and fauna. Such inventories can, at a later stage, be merged with the UNESCO-IOC Register, but in order to facilitate such merging, IOC should provide advice to Member States on proper and relevant data management and training programmes for development of national inventories.

The shortage of experts on the taxonomy of marine organisms, particularly in developing countries, is a major impediment to actions for the *"(...) conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources (...)"* (Convention on Biological Diversity, Article 1). While steps are being taken to train more taxonomists, the IOC should consider the establishment of networks of taxonomists and relevant institutions through the Regional Subsidiary Bodies of the Commission, as well as providing links to global networks of taxonomists.

IOC has, through its TEMA Programme, recommended the establishment of regional reference collections of marine species, and this recommendation is clearly of direct relevance to the Convention on Biological Diversity. Reference collections of various groups of organisms exist in a number of institutions and it would probably not be feasible to recommend the establishment of one centralized regional collection.

Instead, the IOC, through its Regional Subsidiary Bodies, should encourage co-operation and networking among museums and other institutions holding reference collections.

The worldwide destruction of marine and coastal habitats is a great threat to marine biodiversity. The Expert Group considers, however, that the anthropogenic effects on biodiversity often cannot be clearly distinguished from the natural variability in species, populations and ecosystems. Long-term monitoring of the diversity of biological communities and ecosystems is needed, but there is at present no generally recommended sampling design or parameters for monitoring (indices of diversity, species distribution models, indicator species, etc.). **The Expert Consultation recommended** that IOC, possibly through its Group of Experts on the Effects of Pollution (GEEP) and in collaboration with other UNESCO programmes, such as DIVERSITAS, should provide advice to Member States for the selection of parameters and the development of methodologies, including low-technology approaches for monitoring of changes in marine biodiversity and ecosystem condition. Particular efforts should be made to establish methodologies for rapid assessments which do not require the existence of groups of taxonomic experts. A standardized set of parameters and methodologies would also be useful for comparative analyses and for estimates of changes in biodiversity in a global context.

The Expert Consultation strongly recommended that the link between marine biodiversity issues and other issues/topics/legal instruments concerning land-use and land-based sources of pollution be made.

Because of the close relationship between habitat destruction and biodiversity reduction, the **Expert Consultation recommended** national inventories and monitoring of the quantitative extent and qualitative condition of typical habitats (coral reefs, mangrove areas, salt marshes, etc.). Such monitoring should also include studies of the habitats' capacity for recovery from disturbance.

The Expert Consultation further recommended that a global network of representative ecosystems be established for future pilot projects for the integration of baseline inventories, research activities, methods for monitoring (including low-technology approaches), comprehensive management for sustainable use and conservation of marine biodiversity, and community level education.

While IOC should directly support implementation of those recommendations with annual budgets, the consultation also encourages IOC to actively seek additional funds from GEF and other appropriate sources to enhance IOC biodiversity activities.

TEMA related needs and resources in IOC Member States in the field of marine biodiversity

Meaningful and comprehensive attention to the problems of marine biological diversity is critically dependent upon the availability of experts in taxonomy. The TEMA Programme of IOC should take action to enhance the training of taxonomists, but it is beyond the capacity of IOC to meet the needs of each individual Member State for taxonomic expertise.

The Expert Consultation recommended a regional approach to capacity building, e.g. attempts should be made to facilitate the training of taxonomic expertise in the regions. In order to carry out such regional capacity building, the Regional Subsidiary Bodies of the Commission should take steps to upgrade inventories of taxonomists in the region, as well as to identify the needs for further training in order of priority.

The training of an expert in taxonomy is costly and takes a long time, and the urgent need for inventories etc. cannot wait until sufficient high-level expertise is available. **The Expert Consultation recommended** that training programmes be developed for volunteers with interest in biodiversity. An example to consider might be the use of so-called para-taxonomists, who provided a very useful expertise in the rapid assessment of biodiversity and collection of biological material for the National Institute of

Biodiversity (INBIO) in Costa Rica. The training of such cadre of para-taxonomists in Member States would also be an important element in community participation in the protection of marine biodiversity.

Taxonomists in developing countries often work in isolation and without regular access to recent methods and literature. **The Expert Consultation recommended** that the TEMA Programme of IOC develop activities for the upgrading of taxonomic expertise through training courses, study grants and exchange of scientists between institutions.

Through co-ordination and collaboration with TEMA and other UNESCO (i.e. MAB) or UN (i.e. UNEP) programmes, IOC should seek to link science with training and capacity building in the areas of: (i) public education and community awareness in the field of conservation and sustainable use of marine biodiversity; (ii) development or modification of existing local, national and regional integrated management strategies, plans or programmes for the conservation and sustainable use of marine biodiversity; (iii) volunteer low-technology approaches for long-term monitoring of marine biodiversity and ecosystem conditions with emphasis on early detection of changes; and, (iv) promotion of the modification or cancellation of existing harmful commercial and recreational activities and practices to prevent degradation of marine biodiversity and critical habitats.

As to the issue of how the IOC should relate to the Convention on Biological Diversity, the **Expert Consultation recognized** the great importance of international legal instruments as an essential tool to the transfer of scientific knowledge into the decision-making process, thereby ensuring that the scientific understanding of processes is translated into coherent decisions aimed at the sustainable use of the environment in which we live and, where and when necessary, at the development of conservation-oriented measures. The Convention on Biological Diversity represents one of these legal tools. The IOC can play an important role with respect to this Convention, as an intergovernmental mechanism concerned with addressing scientific uncertainties related to the oceans, and with the provision of ocean services and capacity building in the field of oceanography, and also through training and education activities.

The Consultation stressed that the most logical and effective channel for IOC to contribute to the Convention on Biological Diversity would be through provision of advice to SBSTTA on scientific issues concerning marine biodiversity. This is also to be considered in the light of: (i) SBSTTA's first meeting (Paris, 4-8 September 1995), which will, *inter alia*, discuss the agenda item entitled "Provision of advice on the scientific, technical and technological aspects of the conservation and sustainable use of coastal and marine biological diversity, taking into account the other provisions in Art. 25.2 [of the Convention]"; (ii) the Medium-Term Programme of Work of the Conference of the Parties 1995-97, which, *inter alia*, includes the item "Conservation and sustainable use of coastal and marine biodiversity"; (iii) the possibility for IOC to contribute an input on marine biodiversity to the statement of the Conference of the Parties to the Convention on Biological Diversity for the 5th Session of the Commission on Sustainable Development, which will deal with the oceans, in the light of the role the Commission plays and the functions it assumes as the Secretariat for the ACC Sub-Committee on Oceans and Coastal Areas.

6. PREPARATION OF PROPOSAL FOR AN ACTION PLAN FOR FOLLOW-UP, INCLUDING SCHEDULE AND BUDGET INDICATIONS

The Expert Consultation agreed on a draft resolution summarizing the recommendations of the meeting, to be submitted to the Eighteenth Session of the IOC Assembly (Paris, 13-27 June 1995). The Resolution was afterwards amended and approved by the IOC Assembly as Resolution XVIII-9, which is given in Annex VI. The related proposed action plan for follow-up, including schedule and budget indications, is also given in Annex VI.

7. ADOPTION OF THE SUMMARY REPORT

The Expert Consultation adopted the Draft Report of the meeting, including the Draft Resolution on Marine Biodiversity and the related plan of action for follow-up, to be submitted to the Eighteenth Session of the IOC Assembly (Paris, 13-27 June 1995).

8. CLOSURE OF THE MEETING

Prof. Lie, Chairman of the Consultation, thanked all the participants for their valuable contribution to the meeting and for their enthusiasm. He also thanked Dr. Kullenberg, Executive Secretary IOC, for having hosted the meeting and providing a framework for a very productive exchange of views on such an important issue as marine biodiversity. On behalf of all the participants, he also thanked Mr. Aricò for the excellent technical secretarial assistance.

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LIST OF PARTICIPANTS

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ANNEX III

TERMS OF REFERENCE FOR THE IOC-NOAA *AD HOC* CONSULTATION ON MARINE BIODIVERSITY

The IOC-NOAA *ad hoc* Consultation on Marine Biodiversity is composed of regional and international experts in the field of marine biodiversity, who have been selected by the Executive Secretary IOC.

These terms of reference have been developed in conformity with the general specifications for terms of reference of groups of experts contained in the IOC Manual (part I).

The consultation is established to develop an IOC framework for marine biodiversity-oriented activities, and shall:

1. Review the existing IOC programmes and activities of relevance to marine biodiversity, and provide guidance on how to further develop them in order to fully address the problem of marine biodiversity.

2. Consider the future role of IOC with respect to the Convention on Biological Diversity, with a particular view to the potential contribution of IOC to the activities of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to the Convention.

3. Draft a proposal for an IOC programme on marine biodiversity, taking into account the commitments assumed by the Parties to the Convention on Biological Diversity with regard to marine biodiversity.

4. Advise the IOC Governing Bodies on TEMA-related needs and resources in IOC Member States in the field of marine biodiversity.

5. Provide guidelines on possible actions to be undertaken by IOC for submission to the forthcoming session of the IOC Assembly in June 1995.

6. Communicate by correspondence, if necessary, in order to finalize the draft proposal for an IOC programme on marine biodiversity for submission to the IOC Assembly in June 1995.

ANNEX IV

EXTRACTS FROM THE CONVENTION ON BIOLOGICAL DIVERSITY

not available in this version

ANNEX V

BRIEF INTRODUCTION BY EACH PARTICIPANT TO MARINE BIODIVERSITY-RELATED PROBLEMS

M. P. CROSBY
OCEAN AND COASTAL RESOURCE MANAGEMENT, NOS/NOAA
SILVER SPRING, MARYLAND, USA

The approach to sustainable use and conservation of marine biodiversity should also be based on how human activities and interventions are actually planned and carried out. In this respect, it is possible to divide these projects into two categories, those likely to harm marine biodiversity, and those likely to benefit it. Examples of projects belonging to the first category (harmful activities), both land- and coastal/offshore-based, are mining, forestry and poorly designed agriculture projects, dumping of solid or liquid wastes into the marine environment, dredging of contaminated sediments, drilling operations and oil transportation; examples of projects which belong to the second category (benefiting projects) are inventorying coastal ecosystems, species and processes, developing of integrated management area plans, developing environmentally sound fishery technologies, establishing conservation networks.

M. ISAHAKIA
CENTRE FOR BIODIVERSITY, NATIONAL MUSEUMS OF KENYA, NAIROBI, KENYA

The biodiversity programme at the Centre for Biodiversity of the National Museums of Kenya, Nairobi, is not limited to marine issues. The priority areas are: inventories; training in taxonomy; databases and information management; investigation on the applications of products from marine living resources, such as enzymes from hydrothermal vent bacteria; and, traditional knowledge and practice on how to manage biodiversity.

Dr. Daniel LLUCH-BELDA
CENTRE FOR BIOLOGICAL RESEARCH, LA PAZ, MEXICO

Dr. Daniel Lluch-Belda referred to his participation in the GLOBEC Programme and, in particular, the activities carried out by the SCOR Working Group 98 on Worldwide Large-scale Fluctuations of Sardine and Anchovy Populations. In the case of sardine and anchovy natural populations, the sardines are genetically homogenous, and this appears to be related to their geographical distribution, and not attributable to fisheries. He noted that no species extinction has been reported from fisheries. In the case of natural anchovy populations, their very large geographical distribution seems to justify their large genetic variation.

M. K. MOOSA
RESEARCH AND DEVELOPMENT CENTER FOR OCEANOLOGY
INDONESIAN INSTITUTE OF SCIENCES, JAKARTA, INDONESIA

MARINE BIODIVERSITY IN INDONESIA

The region zoogeographically known as the Indo-Malayan region, or the Indo-Malayan triangle, covering New Guinea, has a great concentration of marine life. Indonesia, the main part of the triangle, stretches from 6° N to 10° S and from 95° E to 142° E, is composed of 17,508 islands, has a coastline IOC-NOAA/MBDC-I/3
Annex V - page 2

of 80,791 km, and hosts the most diversified marine life. The coastal zone of Indonesia is rich in estuaries, mangroves, coral reefs, seagrass and algal beds, and many small island ecosystems. Each of these marine ecosystems, with its associated habitat, supports a wealth of marine resources. About 78 % of the Indonesian territory is covered by water, with shallow seas on the western and eastern parts (the Sunda and Sahul plates) separated by the deep Banda Sea. Most of the present knowledge of marine life comes from the shallow water biotas of less than 200 meters deep.

The Indonesian tropical marine habitats, such as coral reefs, seagrass beds and mangrove forests, are known for their rich marine life, probably the largest in the world. The marine life in these shallow water ecosystems is neither well explored nor documented.

Although some historical expeditions have criss-crossed Indonesian seas, such as the Challenger Expedition (1873-1876), the historical Siboga Expedition (1899-1900), which is approaching its 100th anniversary, and the Snellius Expeditions (1921-1930), information on Indonesian marine life is still not sufficiently presented. Some recent noteworthing expeditions are the Baruna Expedition (1964), the Mariel King Memorial Expedition in the Moluccas (1970), the Rumphius Expeditions I-IV (1971, 1973, 1977 and 1980), the Franco-Indonesian Corindon missions (1981 and 1983), the Snellius II Expedition (1984-1985), and most recently, the joint Franco-Indonesian expedition, Karubar.

The Research and Development Center of Oceanology (formerly the National Institute of Oceanology) routinely carries out inventories of Indonesian marine fauna and flora, the results of which are published in various journals, or presented in many symposia and seminars. The list of selected marine organisms presented by SOEGIARTO & POLUNIN (1981) shows that information on many marine taxa, especially animals, is very poor or even lacking.

The study on the biodiversity of the Indonesian marine fauna pre-dated Linnaeus, and is known as "pre-Linnaean Carcinology". Rumphius worked on materials collected from Ambon, the Moluccas, and the vicinity, and materials were probably brought to him from other eastern parts of the Indonesian seas.

Both animal and plant marine biotas have been exploited for human consumption and other purposes far back in the history of mankind. Fish, crustaceans, mollusks, and marine mammals are consumed worldwide for their animal protein and appreciated as delicacies. Coral reefs, fish and other coral inhabitants are displayed in public aquariums, attracting millions of people worldwide. They decorate houses of the wealthy and are good export commodities.

Marine biotas play an important industrial role. Seaweed, coral and shells are exploited as raw materials for industries. Recently people look to the sea for active substances with medical and pharmaceutical applications.

Scientists know very little about the loss of genetic resources and different species from the marine environment. Species or even entire populations have disappeared in historical times. Disturbed or eliminated marine ecosystems could lead to the loss of genetic diversity. Marine ecosystems, especially in coastal areas, which are directly subjected to human activities on land, should be protected from increasing pressures which weaken or destroy its capacity for potential genetic resources for the future generations.

J. VAN DER LAND
NATURAL MUSEUM OF NATURAL HISTORY OF LEIDEN, THE NETHERLANDS

BIOGEOGRAPHICAL ASPECTS OF MARINE BIODIVERSITY

The Museum of Natural History of Leiden is presently carrying out studies on biogeographical aspects of marine biodiversity. These studies are built on the following questions:

- In which geographical areas is marine biodiversity concentrated?
- Within each area, which habitat is the richest in terms of biodiversity?
- Why are these areas scientifically interesting?
- For the study of these areas investigation on key taxonomic groups, such as other symbiotic organisms than corals (i.e. mollusks and other selected groups) should be carried out. This may help explain the scientific interest of these areas.

The current investigations carried out by Dr. van der Land and his group focus on the Indo-Pacific Convergence area, which can be considered as a very relevant region from a "historical" point of view. This is due to the fact that the area is one of the warmest in the world ocean, in a geological context, which would partially explain why biodiversity is so concentrated in this area.

Biodiversity studies on muddy coasts are also carried out, where mangroves are present. The study of theses areas is recommended due to their richness in species diversity.

M. ZHU
FIRST INSTITUTE OF OCEANOGRAPHY
THE STATE OCEANIC ADMINISTRATION, QINGDAO, CHINA

AN INTRODUCTION TO THE ACTION PLAN FOR MARINE BIODIVERSITY CONSERVATION IN CHINA

1. Introduction

China's seas are located in the north-western part of the Pacific Ocean and consist of Bohai Sea, Huanghai (Yellow) Sea, East China Sea and South China Sea, cover three climatic zones (warm-temperate, subtropical and tropical), and are influenced by many oceanic currents such as the continental coastal currents and the Kuroshio warm current. They are all continental margin seas, with a 1800 km coastline. There are more than 1000 estuaries along the coast and 5,000 islands.

Marine biodiversity in the China seas is an important component of the world. According to preliminary statistics, compared with the world's total, the species number of fish in China's seas account for 14%, Cirripeda 24%, insects 20%, mangroves 43%, sea birds 23%, cephalopods 14%. Coral reefs account for 1/3 of those in the Western Pacific and Indian Ocean.

However, in the last few decades, a number of marine species in China's seas disappeared due to human activities, together with the loss of genetic diversity and deterioration of marine ecosystems.

In view of the urgency and significance of marine biodiversity conservation, the State Oceanic Administration (SOA) of China has formed an expert group to develop "The Action Plan for Marine Biodiversity Conservation in China (APMBCC)" in 1992-1994. This plan is one of the important components of "The Biodiversity Conservation Action Plan for the People's Republic of China" and will be a platform document for marine biodiversity conservation activities, offering important guidance in promoting the conservation of rich, multiple and distinct biodiversity of China's seas.

2. Present Status of marine biodiversity in China

2.1. Marine Ecosystem Diversity

In China's seas broad intertidal flats and shallow shelves stretch along the coastline, receiving more than 1,500 large and medium rivers. There are a number of coastal and marine ecosystems, such as the coastal flat, estuaries, coastal wetlands, mangrove, coral reef, marine island and oceanic ecosystems.

The Yellow Sea and the Bohai Sea constitute the warm-temperate marine ecosystem, with coastal ice covers formed in the winter and clear seasonal changes in biotopes. Many marine animals such as *Phoca largha*, *Clupes harengus*, *Gadus macrocephalus*, *Mytilus edulis*, *Haliotis discushannai*, *Ophicura sarsii* and other species of the temperate zone, find their feeding and breeding grounds in these seas.

The East China Sea and the northern section of the South China Sea, including Guangdong, Guangxi and the northwest of Taiwan, are part of the subtropical marine ecosystem. Coral reef and mangrove ecosystems are developed in this region. In addition, at the mouths of the Yangtze and Pearl Rivers, estuarian ecosystems are formed. The recorded number of mangrove subspecies accounts for more than 40 percent of the world's total.

The vast seawater south of Hainan and south-east of Taiwan constitutes the tropical marine ecosystem, with considerable richness in marine species. This ecosystem is characterized by well-developed

coral reefs. Some 185 *Zooxanthellae*-symbiont corals are recorded in these areas, accounting for 22-25 percent of coral species in the Western Indian Oceanic region.

2.2. Species Diversity

Species are the basic units that make up the biosphere. They are constantly changing and developing, but at the same time are relatively constant.

A great number of surveys on the taxa and biomass of marine organisms have been carried out. During the last 70 years, 20,278 species have been recorded in the China Sea. They belong to 5 Kingdoms, 44 phyla. Most are Animalia (12,794 species) and a few Monera (229 species).

The species number increases from North to South.

2.3. Threatened Status of China's Biodiversity and Causes

Since the 1950's there has been a rapid development of coastal economics in China, especially in the last ten years. As exploitation increases, ecological and environmental problems arise.

Over-exploitation of living resources is a major cause of loss of biodiversity in China. The needs and demands of an ever-increasing human population exert an intense and constantly increasing pressure on all biodiversity. The major commercial fish resources showed signs of decline in the early 1960's. In the 1970's, the resources dropped continuously. The demersal fish stock such as the large yellow croaker (*Psiudosciaena crocea*), the little yellow croaker (*Pseudosciaena polyactis*), the haitail (*Trichiurus haumela*), the Chinese herring (*Ilisha elonata*), the Spanish mackerel (*Scomberomorus sinensis*) and the spotted maigre (*Nibea albiflora*) was depleted and the genetic diversity of marine commercial fish also declined.

In recent years, the mariculture industry has grown rapidly. However, coincident with success in the mariculture production, negative environmental impacts on the areas of cultivation were also observed; waste water from culture farms caused organic pollution and eutrophication in seawater, and the occurrences of harmful algae blooms greatly increased. The collection of large quantities of food organisms for shrimp culture reduced the number of shellfish in muddy-sandy flats and disrupted normal trophic relations; the by-catch of considerable amounts of juveniles in shrimping operations damaged fish resources, and the large expanse of culture activities significantly changed the bio-community structure, simplified the species composition and reduced biodiversity in the densely cultured areas and their adjacent waters.

Since the 1960's over 7 million hectares of wetland were reclaimed. This, together with the land formation from natural siltation and artificially reclaimed land from the sea, has caused far-reaching negative influences on marine biotic resources in the water near reclaimed areas. In the early 1950's there were 50,000 hectares of mangroves on the coast of the South China Sea, but at present the area is reduced to 20,000 hectares due to reclamation and felling and the remnants have been degraded and become semi-mangrove and secondary sparse woodlands.

Coral reef resources in China are mainly distributed along the coastline of Hainan island. About one-fourth of the 16,000-kilometer coast line is occupied by coral reefs where marine bio-resources are abundant. In recent years, due to lime mining and handicraft-making by local residents, 80 percent of the coral reefs along the coast of Hainan island have been damaged, and reefs in some sections are on the verge of extinction.

Main pollutants include organics, petroleum, heavy metals and pesticides. These pollutants mainly affect coastal waters, especially estuaries, harbors and bays. For example, along the eastern coast of Jiaozhou Bay near Qingdao, the number of macro-zoobenthos species collected from this area was 147 in 1963-1964, 30 in 1973-1974 and 17 in 1980-1981. In 1985, 260 million tons of industrial effluent, 26 million tons of domestic sewage and 79,000 tons of other pollutants were loaded into Dalian Bay. Some local waters of this bay were free of organisms.

There are, of course, many other contributors to biodiversity loss in China. To a large degree, the various threats work together to multiply the respective impacts on biological resources. For example, the over-exploitation described above combines with habitat loss to greatly increase the threat to biodiversity.

A further related threat is the breakdown of ecological functions, which is a step beyond simple habitat destruction. The destruction of reefs, coastal wetlands, mangrove forests and other forms of destruction of coastal habitats leads to collapse of the functioning of marine or coastal ecosystems.

A threat of another kind - and particularly important to biodiversity - comes from failure of the supporting measures that are essential to any country which carries out effective biodiversity conservation. They include the nation's policies, laws and their enforcement (or lack of enforcement), along with the institutional problems due to a multitude of different administrative organizations with responsibilities and authorities affecting conservation.

ANNEX VI

RESOLUTION ON MARINE BIODIVERSITY
(as amended by the IOC Assembly at its Eighteenth Session (Paris, 13-27 June 1995) and adopted as Resolution XVIII-9)

The Intergovernmental Oceanographic Commission,

Recognizing the great importance of conserving marine biodiversity, including the need for research in the subject area,

Taking into account that successful implementation of the Convention on Biological Diversity will address the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources,

Taking into account the United Nations Convention on the Law of the Sea,

Noting that the Convention on Biological Diversity calls on the assistance, where appropriate, of competent international organizations to the Contracting Parties to the Convention, for its implementation,

Noting also that the First Meeting of the Conference of the Parties to the Convention on Biological Diversity adopted decision I/7 pertaining to the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), which, *inter alia*, states that at its first ordinary meeting, SBSTTA shall consider its *modus* operandi as well as the need to draw on relevant existing institutional structures; and, that the provisional agenda for SBSTTA's first ordinary meeting, as reported in decision I/7, will *inter alia* deal with provision of advice on the scientific, technical and technological aspects of the conservation and sustainable use of coastal and marine biological diversity (priority item),

Emphasizing the importance of re-evaluating the IOC existing programmes and activities to review the scope for enhancing marine biodiversity study as an IOC activity,

Recognizing that IOC has a substantial role to play in providing the Conference of the Parties to the Convention on Biological Diversity, through its Subsidiary Body on Scientific, Technical and Technological Advice, with advice on scientific issues concerning marine biodiversity,

Decides to continue the *ad hoc* Consultation of Experts on Marine Biodiversity as needed, drawing on other relevant programme activities of the IOC for implementation of its recommendations;

Instructs the Executive Secretary IOC to communicate with the Chair of SBSTTA on: the submission on behalf of IOC to the First meeting of SBSTTA of the report of the IOC-NOAA *ad hoc* Consultation on Marine Biodiversity; and, the identification of specific needs and requirements of SBSTTA for scientific input which can be provided by IOC;

Instructs the Executive Secretary IOC to interact with the International Sea-Bed Authority on matters of the effects of possible future exploitation of sea-bed resources and dumping on marine biodiversity, as well as to discuss the possibility for IOC to provide scientific input to the International Sea Bed Authority in this respect;

Instructs also the Executive Secretary IOC to strengthen links with the Man and Biosphere Programme in order to develop joint activities in the field of sustainable use and conservation of marine biodiversity;

Urges Member States to undertake efforts at the national and regional levels to compile inventories of their marine flora and fauna, building on existing data bases, containing *inter alia* species description and figures, ecological information and distribution and economical importance;

Takes note of activities listed in Annex 1 attached to the Executive Summary of the *ad hoc* Consultation (Document IOC-XVIII/2 Annex 9), and particularly encourages the pursuit of those activities which can be conducted at no cost to the IOC.

Financial implications: US$ 55,000

Addendum to Annex VI
IOC MARINE BIODIVERSITY PLAN OF ACTION 1995-97

ACTIVITY	FOCAL POINT	FUNDS REQUIRED	TIME FRAME	PRIORITY
Valuation of BD in cost-benefit analyses	IOC Secretariat in co-operation with UNEP-OCA/PAC	US $ 5,000	1996	High
Appraisal of the state of marine BD	IOC Secretariat in co-ordination with the Secretariat of the CBD	?	1996-97	High
Identification of parameters and development of methodologies for monitoring changes in marine BD (including low-tech methodologies)	GEEP; IOC Secretariat in collaboration with DIVERSITAS	No cost (work to be done through correspondence)	1996	High
Identification of a global network of representative ecosystems for future projects for integration of baseline inventories, research activities, methods for monitoring (including low-technology approaches), comprehensive management for sustainable use and conservation of marine biodiversity, and community level education	IOC Secretariat in collaboration with MAB	Funds to be identified, depending on the working strategy adopted (organization of a workshop?)	1996-97	High
Integration of the UNESCO-IOC Register of Marine Organisms with the IUBS-ICSU-IUMS Species 2000 Programme	IOC Secretariat in co-ordination with the Editor of the Project	No cost	Start in 1995	High
Training on development of national inventories and management of biological data (on a rotating basis among the IOC Regional Bodies)	IOC Secretariat	US $ 20,000 on an annual basis	1996-97	High
Establishment of networks (or regional inventories of) taxonomists through the IOC Regional Bodies	IOC Regional Bodies	No cost	Start in 1995	High
Short-term training in para-taxonomy	IOC Secretariat	Funds to be made available within TEMA	1995-97	High
Upgrading expertise through training courses, study grants and exchange of scientists	IOC Secretariat	Funds to be made available within TEMA	on-going	High
Long-term high level education in taxonomy (fellowships for Master and Ph. D. programmes in taxonomy)	IOC Secretariat	IOC Secretariat to seek funds	To start in 1996	Medium
Pilot projects on PA/EE concerning marine BD	IOC Secretariat in collaboration with UNESCO-EPD	US $ 10,000 for the first pilot project (costs to be shared with UNESCO-EPD?)	1996-97	High

ANNEX VII

LIST OF ACRONYMS

ACC	UN Administrative Committee on Co-ordination
CBD	Convention on Biological Diversity
FCCC	United Nations Framework Convention on Climate Change
GLOBEC	Global Ocean Ecosystems Dynamics
GOOS	Global Ocean Observing System
HAB	Harmful Algal Bloom Programme
IGBP	International Geosphere-Biosphere Programme
ICSU	International Council of Scientific Unions
IODE	International Oceanographic Data and Information Exchange Programme
IUBS	International Union of Biological Sciences
IUMS	International Union of Microbiological Societies
JGOFS	Joint Global Ocean Flux Study
LME	Large Marine Ecosystems
LOICZ	Land-Ocean Interaction in the Coastal Zone
MIM	Marine Information Management
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	National Oceanographic Data Centers
OSLR	Ocean Science in Relation to Living Resources Programme
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice to the Convention on Biological Diversity
TEMA	Programme on Training, Education and Mutual Assistance in Marine Sciences
UNCED	United Nations Conference on Environment and Development (Rio de Janeiro, June 1992)
UNCLOS	United Nations Convention on the Law of the Sea
WCRP	World Climate Research Programme