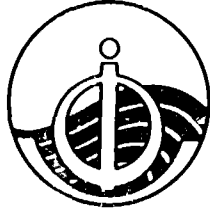


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Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies



UNEP-IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs

Second Meeting

Miami, Florida, USA, 2-4 June 1993

UNESCO

In this Series, entitled

Reports of Meetings of Experts and Equivalent Bodies, which was initiated in 1984 and which is published in English only, unless otherwise specified, the reports of the following meetings have already been issued

1. Third Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
2. Fourth Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
3. Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' (*Also printed in Spanish*)
4. First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
5. First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
6. First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
7. First Session of the Joint CCOP(SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
8. First Session of the IODE Group of Experts on Marine Information Management
9. Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
10. Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
11. First Session of the IOC Consultative Group on Ocean Mapping (*Also printed in French and Spanish*)
12. Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
13. Second Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
14. Third Session of the Group of Experts on Format Development
15. Eleventh Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
16. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
17. Seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
18. Second Session of the IOC Group of Experts on Effects of Pollutants
19. Primera Reunión del Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y Parte del Océano Pacífico frente a Centroamérica (*Spanish only*)
20. Third Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
21. Twelfth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
22. Second Session of the IODE Group of Experts on Marine Information Management
23. First Session of the IOC Group of Experts on Marine Geology and Geophysics in the Western Pacific
24. Second Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources (*Also printed in French and Spanish*)
25. Third Session of the IOC Group of Experts on Effects of Pollutants
26. Eighth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
27. Eleventh Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (*Also printed in French*)
28. Second Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
29. First Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
30. First Session of the IOC-ARIBE Group of Experts on Recruitment in Tropical Coastal Demersal Communities (*Also printed in Spanish*)
31. Second IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
32. Thirteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asia Tectonics and Resources
33. Second Session of the IOC Task Team on the Global Sea-Level Observing System
34. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
35. Fourth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
36. First Consultative Meeting on RNODCs and Climate Data Services
37. Second Joint IOC-WMO Meeting of Experts on IGOSS-IODE Data Flow
38. Fourth Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
39. Fourth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
40. Fourteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
41. Third Session of the IOC Consultative Group on Ocean Mapping
42. Sixth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' (*Also printed in Spanish*)
43. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
44. Third Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
45. Ninth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
46. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
47. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
48. Twelfth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
49. Fifteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
50. Third Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
51. First Session of the IOC Group of Experts on the Global Sea-Level Observing System
52. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean
53. First Session of the IOC Editorial Board for the International Chart of the Central Eastern Atlantic (*Also printed in French*)
54. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (*Also printed in Spanish*)
55. Fifth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
56. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
57. First Meeting of the IOC *ad hoc* Group of Experts on Ocean Mapping in the WESTPAC Area
58. Fourth Session of the IOC Consultative Group on Ocean Mapping
59. Second Session of the IOC-WMO/IGOSS Group of Experts on Operations and Technical Applications
60. Second Session of the IOC Group of Experts on the Global Sea-Level Observing System
61. UNEP-IOC-WMO Meeting of Experts on Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change
62. Third Session of the IOC-FAO Group of Experts on the Programme of Ocean Science in Relation to Living Resources
63. Second Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
64. Joint Meeting of the Group of Experts on Pollutants and the Group of Experts on Methods, Standards and Intercalibration
65. First Meeting of the Working Group on Oceanographic Co-operation in the ROPME Sea Area
66. Fifth Session of the Editorial Board for the International Bathymetric and its Geological/Geophysical Series
67. Thirteenth Session of the IOC-IHO Joint Guiding Committee for the General Bathymetric Chart of the Oceans (*Also printed in French*)
68. International Meeting of Scientific and Technical Experts on Climate Change and Oceans
69. UNEP-IOC-WMO-IUCN Meeting of Experts on a Long-Term Global Monitoring System
70. Fourth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
71. ROPME-IOC Meeting of the Steering Committee on Oceanographic Co-operation in the ROPME Sea Area
72. Seventh Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' (*Spanish only*)
73. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (*Also printed in Spanish*)
74. UN/IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs
75. Third Session of the IODE Group of Experts on Marine Information Management
76. Fifth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
77. ROPME-IOC Meeting of the Steering Committee for the Integrated Project Plan for the Coastal and Marine Environment of the ROPME Sea Area
78. Third Session of the IOC Group of Experts on the Global Sea-level Observing System
79. Third Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
80. Fourteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
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**UNEP-IOC-ASPEI Global Task
Team on the Implications of
Climate Change on Coral Reefs**

Second Meeting

Miami, Florida, USA, 2-4 June 1993

UNESCO

SC-93/WS.48

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I	Agenda
II	List of Participants
III	List of Documents
IV	Final Outline of The Implications of Climate Change for Sustainable Use of Coral Reefs
V	List of Countries and Institutions Having Indicated Agreement to Participate in the Global Monitoring of Coral Reefs

1. OPENING OF THE MEETING

- 1 The meeting was opened at 13.00 on June 2nd 1993, at the Rosenstiel School of Marine and Atmospheric Science (RSMAS) of the University of Miami, USA., by Dr. M. Gerges, Deputy Director of the Oceans and Coastal Areas Programme Activity Centre (OCA/PAC) of the United Nations Environment Programme (UNEP), on behalf of the co-sponsoring organizations. He welcomed the participants to the second meeting of the Global Task Team on the implications of Climate Change on Coral Reefs. The members of the Task Team and participants in the meeting are listed in Annex II to this report.
- 2 In his opening remarks Dr. M. Gerges expressed the satisfaction of UNEP and the Intergovernmental Oceanographic Commission (IOC) with the progress achieved thus far, in the work of the Task Team towards fulfilling its main objective; that is the preparation of an authoritative scientific and technical review of the impacts of climate change on coral reef ecosystems worldwide. He pointed out that the outcome of the collective effort of the Task Team constitutes an important contribution to the climate change related programmes being undertaken by several organizations and international bodies, particularly by UNEP, IOC, the World Conservation Union (IUCN) and the Intergovernmental Panel on Climate Change (IPCC). He further expressed the hope that during this meeting the Task Team would be able to finalize the draft overview and to present and discuss some site specific case studies related to climate change impacts on coral reefs. He further indicated that in several areas of the world, coral reefs are considered of great economic and ecological importance and, that they deserve the attention given to them by the above named international organizations and many national institutions worldwide. Dr. Gerges thanked the co-ordinator of the Task Team, Dr. C. Wilkinson and Dr. R.W. Buddemeier for their efforts in preparing the first, second and third drafts of the overview for the consideration of the meeting and the members of the Task Team for their contributions to these drafts. He also expressed appreciation to the University of Miami and Dr. R. Ginsburg of the RSMAS for hosting the meeting.
- 3 Professor Harley Manner, Chairman of the Association of South Pacific Environmental Institutions (ASPEI), welcomed the participants to the second meeting of the Global Task Team on the implications of Climate Change on coral reefs. He recalled the origin of the Task Team which stemmed from a recommendation of ASPEI to UNEP in 1990 concerning the need for the formation of a Global Task Team given the importance of coral reefs to a large number of countries in a wide diversity of regions. He further commended the authors of the draft overview for their hard work in preparing the text for the consideration of the meeting and expressed the hope that the meeting would successfully complete the overview and thus one major item in their terms of reference as agreed at the first meeting in Guam.
- 4 Dr. J. Pernetta, welcomed participants on behalf of the Secretary of the IOC and informed them that the Secretary of the IOC wished to convey his hopes for a successful and productive meeting. He further stated that the IOC had high expectations of the meeting in that it was hoped that this Task Team meeting would formulate recommendations addressed to the IOC and UNEP for support, covering important but realistic tasks for 1994 concerning the implementation of the UNEP-IOC-WMO-IUCN sponsored Coral Reef pilot phase monitoring activity of the Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change.
- 5 At this point Dr. Gerges, invited Dr. C. Wilkinson as Co-ordinator of the Task Team to assume the Chair. Dr. Wilkinson welcomed members of the Task team and expressed his desire for a fruitful and productive meeting.

2. ORGANIZATION OF THE MEETING

2.1 ELECTION OF MEETING'S RAPPORTEUR

6 Dr. C. Birkeland proposed and the meeting agreed that Dr. J. Pernetta acted as Rapporteur.

2.2 PROGRAMME AND TIMETABLE

7 The Chairman proposed a draft workplan and timetable which was accepted by the meeting. It was agreed that the meeting would meet between the hours of 8.30 am and 5.30 and that evening sessions would be scheduled as required. He drew the attention of the meeting to the available background and information documents which are listed in Annex III to this report.

3. ADOPTION OF THE AGENDA

8 The provisional agenda was adopted by the meeting and is appended as Annex I to this report.

4. PRESENTATION OF THE DRAFT OVERVIEW BY THE TASK TEAM CO-ORDINATOR

4.1 GENERAL PRESENTATION OF THE OVERVIEW AND PRELIMINARY DISCUSSION OF THE TARGET AUDIENCE, SCHEDULE AND CONTENT WITH INTRODUCTION OF THE CONCEPT OF THE EXECUTIVE SUMMARY DOCUMENT FOR GENERAL DISTRIBUTION

9 The draft overview entitled "The implications of Climate Change for Sustainable Use of Coral Reefs" was presented to the meeting by the Chairman and there followed an initial series of comments from each member of the Task Team concerning the general level and approach adopted in the draft report.

10 The meeting was reminded by the Representative of UNEP of the agreements reached during the first meeting in Guam concerning the audience of the report, namely that the main report should be directed to the scientific advisors to government policy and decision makers and that the Executive summary should be directed towards the policy and decision makers themselves. The meeting was urged to keep these decisions in mind in suggesting editorial revisions to the draft text.

11 The suggestion was made by Dr. Pernetta and accepted by the meeting that certain issues should be drawn out of the main body of the text and presented in "box" form to highlight important issues, factual material and themes and thus assist in producing a uniform flow throughout the body of the text.

12 Dr. R.W. Juddemeier and Dr. C. Wilkinson indicated that the draft text as presented to the meeting included a number of annexes of material which they had been unable to incorporate into the text as presented to the meeting. An extensive discussion ensued concerning the regional reports, which were available to the meeting and it was agreed that regional reports of no more than 2 to 3 pages would be prepared and that a new chapter would be included or that these should be incorporated into the text, possibly in Chapter V. These would provide a regional perspective in the document. The agreed regional breakdown and responsibilities of individual Task Team members in preparing the various sections of this chapter were agreed by the meeting. Details of responsibilities are contained in the final table of contents contained in Annex IV.

13 It was agreed that prior to a detailed consideration of the draft text, individual meeting participants would consider the material which could be presented in box form and that these boxes should be identified and their content discussed.

14 A detailed listing of some 28 topics for potential coverage in boxes was then prepared and considered by the meeting. Having agreed an initial list, consideration was then given to their placement in the various chapters; to the potential authors and to the various ways in which topics identified by individual Task Team members could be combined, integrated and generally related both to one another and to the body of the text.

4.2 IDENTIFICATION OF GAPS, AMENDMENTS AND ADDITIONS TO THE TEXT

15 The draft text as presented to the meeting was discussed *in extenso* and various modifications, additions and amendments were suggested and accepted by the meeting. Minor editorial comments were marked on individual copies of the draft overview for incorporation and consideration by the joint editors.

4.3 FINALIZATION OF THE CONTENTS OF THE OVERVIEW

16 In the light of the discussion held under agenda items 4.1 and 4.2 a final timetable and workplan for completion of the overview and Executive summary was agreed by the meeting as follows:

Individual Task Team members would despatch regional sections, text for boxes and figures by Facsimile or e-mail to reach both co-editors no later than July 6th.

The details of individual Task Team members responsibilities are contained in Annex IV to this report.

5. PUBLICATION OF THE OVERVIEW: PLAN AND TIMETABLE

5.1 PUBLICATION AS UNEP REGIONAL SEAS REPORTS AND STUDIES - FORMAT, FUNDING, TIMETABLE, DISTRIBUTION LIST AND NUMBERS

17 Under this agenda item, the Representative of UNEP outlined the necessary steps which must be completed to ensure prompt publication of the report by UNEP in its Regional Seas Reports and Studies (RSRS) series.

18 Dr. Gerges agreed to provide the two editors with the necessary information concerning OCA/PAC's house styles and editorial policy on his return to UNEP, and indicated that provision of a camera ready original of the document prepared according to the style guidelines would ensure rapid publication by UNEP within a period of two to three months.

19 Dr. Gerges further indicated that publication of between 1,000 and 1,500 copies was a normal print run for the UNEP RSRS and that these would be distributed worldwide to National Focal points of UNEP, and to a large number of national institutions participating in the regional seas programme; and to individual scientists and agencies on request. He further indicated that funds to support this publication would be provided by UNEP.

6. DISCUSSION OF THE EXECUTIVE SUMMARY AND REPORT

6.1 CONCEPT OF EXECUTIVE REPORT: CONTENT, FORMAT AND AUDIENCE

20 The meeting discussed the concept of separate publication of the Executive Summary as an Executive Report and agreed that a well illustrated document of between twenty and thirty pages was needed to present the information contained in the overview in a more abbreviated and less technical manner for policy and decision makers.

21 It was recognized that assistance would be required by Drs. Buddemeier and Wilkinson

in the preparation of this review and that two modes of preparing such a document were possible. Either Drs. Buddemeier and Wilkinson could prepare a draft for review and rewriting by a competent popular science editor/writer; or a science writer could be contracted to take the overview and prepare a text for clearance by the compilers of the overview.

6.2 PUBLICATION OF EXECUTIVE REPORT: TIMETABLE, FUNDING AND DISTRIBUTION

22 It was suggested that, if possible, this Executive Report should be produced in advance of the IPCC World Coast's Conference in November 1993. This would ensure its distribution to a wide circle of policy and decision makers in addition to the normal distribution networks of the co-sponsoring agencies. The advantage of presenting it to the November IPCC meeting would be that this would alert the IPCC to the existence of the overview thus ensuring that the contents of the Task Team's Overview were taken into consideration during the preparation of the IPCC 1995 Assessment Report.

23 It was recognized that if Drs. Buddemeier and Wilkinson were asked to produce the text on their own, then it would not be possible to meet this deadline.

24 The Representative of UNEP indicated that funds for publication of the Executive Report were not available in 1993 and that the earliest that such funds might be available would be in 1994. The IOC also considers its possible financial support within the draft programme and budget for 1994-1995.

25 Dr. Elder indicated that it might prove possible for IUCN to financially support the publication of the Executive Report, if this were to prove acceptable to the other co-sponsoring agencies. Dr. Gerges indicated that on behalf of UNEP he welcomed the offer made by IUCN and foresaw no difficulty in this regard.

6.3 PUBLICATION OF THE EXECUTIVE REPORT FOR WIDE DISTRIBUTION

26 The Task Team gratefully acknowledged the provisional offer by the IUCN to assist in the production of an Executive Report, through the commissioning of a professional scientific writer to produce such a document.

27 Dr. Manner proposed that the Task Team request the IUCN to investigate the production of an Executive Report through the use of a professional writer, and that the IUCN would negotiate with the co-sponsoring agencies and the co-editors (Drs. Buddemeier and Wilkinson), on the format and style of the Report. The Meeting agreed to this proposal.

7. OPEN DISCUSSION OF STRESS IN CORAL REEFS: NATURAL, CLIMATIC AND DIRECT ANTHROPOGENIC SOURCES; STRATEGIES FOR ASSESSING STRESS IMPACTS AND LONG-TERM MONITORING; THE ROLE AND INVOLVEMENT OF THE AGENCIES

28 An extensive and wide-ranging discussion was held on Thursday evening concerning the relationship between the proposed case studies and the long-term global monitoring activity for coral reefs; on the problems of sustainability of reef ecosystems under present scenarios of global change stress, and the need for urgent action on the part of the international agencies in capitalising upon and further stimulating participation in the global coral reef monitoring activity.

29 The possible relationship between the case study activities proposed by UNEP and future sites for inclusion in the global monitoring network, once established, was discussed and it was agreed that there was a need to ensure appropriate linkage between these future activities.

8. SELECTION OF SITE SPECIFIC CASE STUDIES

30 The Representative from UNEP requested that the Task Team consider whether case studies of potential climate change impacts on specific coral reef sites could and/or should be initiated. He indicated that the regional Task Teams on Climate Change Impacts had identified vulnerable areas and regions and had carried out a number of detailed assessments of climate change impacts for specific areas. One objective of such studies was to provide management advice and assistance to local and national authorities concerning the possible mitigation and/or avoidance of the identified potential impacts.

31 The meeting felt that identifying particularly vulnerable coral reef areas at the present state of knowledge was not possible and that perhaps a different approach to such site specific activities might be appropriate in this instance. The meeting considered that building infrastructure in a large number of countries, particularly those in the developing world, by training scientists in methods of assessing coral reefs would be a better use of the money than several site specific case studies of limited regional application.

32 Following an initial discussion and in the light of the points raised during the evening session it was suggested that discussion of agenda items 8 and 9 be taken together and this was agreed. The relationship between long-term monitoring sites, case study sites and the objectives of each were briefly reviewed and the following conclusions reached:

- (i) In order to provide the greatest cost-effectiveness and to keep the monitoring and assessment methods current with scientific developments in a rapidly evolving field, the Task Team recommended that any site specific activities or impact scenarios be closely co-ordinated with existing or proposed monitoring sites established under the Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change.
- (ii) The objective of any future case study activities might include the assessment of site sensitivity and vulnerability, and the provision of additional technical support to local institutions.
- (iii) The co-ordination of case studies with monitoring activities would have the additional benefit of assisting in refining the monitoring strategies; in the interpretation of results; and potentially they could be used as a mechanism for training personnel to provide the necessary, trained reef monitors in the countries participating in the monitoring network.

33 It was suggested by the meeting that funds could most profitably be deployed at this stage in support of the development of the monitoring system and that regional training workshops in the common monitoring methodology would not only serve to provide a pool of people familiar with the agreed monitoring methods but would also result in assessment of the reef sites used during the training.

34 It was proposed by Dr. Baker that Dr. Wilkinson should co-ordinate the activities of the Task Team in this regard and the Representative of UNEP indicated that he would be seeking a full proposal from Dr. Wilkinson for possible financial support from UNEP within available resources.

35 Noting the similarity in methods used by the Caribbean Coastal Marine Productivity programme (CARICOMP) it was suggested that CARICOMP could also provide trainers for such workshops.

9. REVIEW OF THE STATUS OF THE UNEP-IOC-WMO-IUCN PILOT ACTIVITY ON CORAL REEFS OF THE "LONG-TERM GLOBAL MONITORING SYSTEM OF COASTAL AND NEAR-SHORE PHENOMENA RELATED TO CLIMATE CHANGE"

9.1 STATUS REPORT BY THE JOINT SECRETARIAT (UNEP-IOC)

36 The Representative of UNEP briefed the meeting on behalf of the co-sponsoring agencies concerning developments to date in implementing the Long-Term Global Monitoring System for Coastal and Near-Shore Phenomena Related to Climate Change with special reference to Pilot Phase activities.

37 Dr. Pernøtta drew the attention of the meeting to the various reports, submitted by IOC, relating to the pilot phase activities (Doc. IOC/INF-908, Inf. documents 1, 2 and 3) and indicated that developments were at such a stage that initiation of on-site activities was not only possible but highly desirable if the initial enthusiasm of potential participants was to be maintained. He further drew the attention of the meeting to the list of countries (Annex V) which have indicated a desire to participate in the coral reef monitoring activity.

9.2 IUCN REPORT ON "MONITORING CORAL REEFS FOR GLOBAL CHANGE"

38 Dr. Elder, of the IUCN introduced the document entitled "Monitoring coral reefs for Global Change" recently published by IUCN. He pointed out that it contained a review of the various activities and meetings leading to the establishment of the Long-Term Global Monitoring System of Coastal and Near-shore Phenomena related to Climate Change, as well as an Annex presenting the agreed monitoring methodology. It had been prepared for wide distribution within IUCN and its partners.

39 A major aim of IUCN was to promote the adoption of "Monitoring coral reefs for Global Change" as a management objective for marine protected areas within IUCN's efforts to promote the establishment of a global system of marine protected areas. He pointed out that this approach will be the subject of discussions within marine workshops of the IUCN General Assembly planned for February 1994 in Buenos Aires.

40 Finally, Dr. Elder gave the opinion that there was considerable commitment on the part of potential participating Institutions and by some funding agencies; but what was presently lacking was the necessary level of institutional and financial support from the sponsoring agencies to get the monitoring programme moving forward rapidly.

41 The Task Team, on the recommendation of the Chair of ASPEI, requested that the co-sponsoring agencies of the Global Task Team (UNEP-IOC-ASPEI) extend a formal invitation to the IUCN to participate as a co-sponsor of the Task Team.

9.3 POSSIBLE ROLE OF THE TASK TEAM AS ADVISORY GROUP ON MONITORING ACTIVITIES

42 To understand the effects of and vulnerability to, the combination of climate change and other anthropogenic stresses on coral reef environments and resources, the Task Team confirmed that monitoring and assessment of coral reef ecosystems is not only important, but also a matter of urgency.

43 The Task Team reaffirms its support for the conceptual approach and general implementation strategies as developed and refined at the expert meeting held in Paris in 1990; the Meeting of experts on a Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change: Pilot projects on Mangroves and Coral Reefs, held in Monaco in 1991; the UNEP-UNESCO-IOC-WMO-IUCN-SPREP-SCOR-CARICOMP-PACICOMP Workshop to organize a co-ordinated network of tropical marine laboratories to monitor reef responses to global change, held in Guam in 1992 and urges the agencies presently and

potentially responsible and participating in reef monitoring and/or assessment programmes to proceed with all practical speed to implement and maintain a co-ordinated international programme.

44 The Task Team recognizes the need for close co-operation with the existing regional coral reef monitoring programmes, such as the CARICOMP network of Caribbean marine laboratories, and encourages the development of others now in the planning stages, such as the Pacific Coastal Marine Productivity programme (PACICOMP). Clearly over the long term, global co-ordination and integration of coral reef monitoring programmes is a major goal, and the Task Team will serve as a resource for consultation and advice in this regard.

45 The Task Team stressed that the most urgent and immediate need in order to establish an internationally integrated coral reef monitoring programme is for the designation of a responsible programme office to act as an effective point of contact for communication, co-ordination, inter-agency liaison; and to provide a data repository and processing services for the participating institutions and national agencies.

46 The Task Team urges the co-sponsoring agencies to establish contact with agencies and national institutions that may be able to provide assistance with data management and data analysis for the international coral reef monitoring effort and that a programme to provide data management support should be provided at the earliest opportunity. It was suggested that the joint Secretariat should make approaches to appropriate agencies for technical support in this regard as promptly as possible.

10. FUTURE WORKPLAN OF THE TASK TEAM

10.1 TIMETABLE FOR THE FINALIZATION AND SUBMISSION OF THE TEXT OF THE OVERVIEW AND THE EXECUTIVE REPORT

47 Discussion concerning the timetable for finalization and publication of the overview concluded that, provided the members of the Task Team completed their writing tasks in advance of the July 6th deadline as previously agreed, the joint editors would be in a position to finalize the text and figures in camera ready form by October 6th.

48 Under this agenda item the Task Team also agreed that:

- (i) It stood ready to assist the joint secretariat through the provision of advice concerning the implementation of the long-term monitoring of coral reefs as a pilot phase activity of the Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change:
- (ii) That the Chairman, in consultation with members of the Task Team, would provide the joint Secretariat with a workplan and budget for the implementation of proposed training workshops in support of the implementation of the pilot phase activity on monitoring coral reefs these workshops should ideally be undertaken in several regions of the world. To reduce costs; increase the numbers of trainees; and incorporate regional differences in reef structure into the training; they should make use of the pool of people trained in the use of these methods from the ASEAN countries and CARICOMP.
- (iii) That the Task Team was ready to provide advice to IUCN in the preparation of methodologies for assessing the vulnerability of coral reefs to climate change and to critically review the outputs from IUCN's initial development of a comparative vulnerability assessment of coral reefs. This work was intended as an input to the current work of the IPCC Coastal Zone Management Sub-group.

11. OTHER MATTERS

49 The Task Team noted the request to the IOC from the Pacific Science Association concerning possible revision, and re-publication of the Directory of Coral Reef Researchers. Members indicated that the directory was useful but that if it were to be revised then the format for entries would need to be reworked to include *inter alia* E-mail addresses. The Task Team noted that the bibliographies and directories programme of UNEP was no longer operational and agreed that the Secretariat should consider publication of a revised directory only if the necessary funds were available from sources other than those which could be used to support development of the monitoring network.

12. ADOPTION OF THE MEETING REPORT

50 The meeting considered and approved the report as it appears in this document.

13. CLOSURE OF THE MEETING

51 Dr. M. Gerges, on behalf of the joint Secretariat, expressed his thanks and appreciation to the members of the Task Team for their keen interest in the work of the Task Team and for the high spirit of co-operation which prevailed during the meeting. A special word of thanks was extended to the Chairman, the Co-editor of the Overview, Dr. Buddemeier, and to the Rapporteur Dr. Pernetta for his hard work and dedication which contributed to the successful conclusion of the meeting. Finally he welcomed the proposal for IUCN to become a co-sponsor of the Task Team and extended his thanks to IUCN for their assistance and inputs to date.

52 Dr. H. Manner as Chair of ASPEI, thanked the participants for their hard work and in particular Drs. Wilkinson and Buddemeier for their sterling efforts in preparing the draft and in undertaking to complete the revision and editing of the text. He expressed thanks on behalf of the participants to Drs. Ogden, Buddemeier and Fautin for the provision of transport and all the time spent ferrying participants around, and welcomed the involvement of IUCN in the work of the Task Team.

53 In closing the meeting, the Chairman of the Task Team thanked most sincerely, Professor R. Ginsburg and his staff at the Rosensteil School of Marine and Atmospheric Science for providing the meeting room and secretarial facilities. He also thanked, Dr. L. Elder of IUCN for participating in the meeting and providing documentation and encouragement for furthering the process of establishing a global programme for the monitoring of coral reefs. The provisional offer to publish an Executive Report was particularly welcomed.

54 The Chairman especially thanked Dr. M. Gerges the Representative of UNEP and wished to convey thanks to the IOC Secretariat for their assistance in organizing the meeting and promoting the interests of the Task Team through the IOC and UNEP systems. Special thanks were made for the prompt publication of the Manual on Monitoring Coral Reefs for Global Change published on behalf of the project sponsors by UNEP in April 1993. The Chairman thanked Dr. J. Pernetta for acting as rapporteur for the meeting; as advisor to the Task Teams; and for acting as an unofficial source of information on progress made within IOC.

55 The Chairman thanked Dr. Harley Manner, the Chair of ASPEI for his pithy comments designed to ensure that the Task Team met its objectives. Finally the Chairman thanked the members of the Task Team for their efforts, both prior to this meeting in providing material for the Overview and for their active participation in the discussions and editing of the Report. The Chair was especially appreciative of, and grateful for, the extensive efforts of Dr. R.W. Buddemeier, without whose efforts, there would have been no draft report.

56 The Chairman closed the meeting at 18.30 on 4 June 1993.

ANNEX I

AGENDA

- 1. OPENING OF THE MEETING**
- 2. ORGANIZATION OF THE MEETING**
 - 2.1 ELECTION OF MEETING'S RAPPORTEUR
 - 2.2 PROGRAMME AND TIMETABLE
- 3. ADOPTION OF THE AGENDA**
- 4. PRESENTATION OF THE DRAFT OVERVIEW BY THE TASK TEAM CO-ORDINATOR**
 - 4.1 GENERAL PRESENTATION OF THE OVERVIEW AND PRELIMINARY DISCUSSION OF THE TARGET AUDIENCE, SCHEDULE AND CONTENT WITH INTRODUCTION OF THE CONCEPT OF THE EXECUTIVE SUMMARY DOCUMENT FOR GENERAL DISTRIBUTION
 - 4.2 IDENTIFICATION OF GAPS, AMENDMENTS AND ADDITIONS TO THE TEXT
 - 4.3 FINALIZATION OF THE CONTENTS OF THE OVERVIEW
- 5. PUBLICATION OF THE OVERVIEW: PLAN AND TIMETABLE**
 - 5.1 PUBLICATION AS UNEP REGIONAL SEAS REPORTS AND STUDIES - FORMAT, FUNDING, TIMETABLE, DISTRIBUTION LIST AND NUMBERS
- 6. DISCUSSION OF THE EXECUTIVE SUMMARY AND REPORT**
 - 6.1 CONCEPT OF EXECUTIVE REPORT: CONTENT, FORMAT AND AUDIENCE
 - 6.2 PUBLICATION OF EXECUTIVE REPORT: TIMETABLE, FUNDING AND DISTRIBUTION
 - 6.3 PUBLICATION OF THE EXECUTIVE REPORT FOR WIDE DISTRIBUTION
- 7. OPEN DISCUSSION OF STRESS IN CORAL REEFS: NATURAL, CLIMATIC AND DIRECT ANTHROPOGENIC SOURCES; STRATEGIES FOR ASSESSING STRESS IMPACTS AND LONG-TERM MONITORING; THE ROLE AND INVOLVEMENT OF THE AGENCIES**
- 8. SELECTION OF SITE SPECIFIC CASE STUDIES**

- 9. REVIEW OF THE STATUS OF THE UNEP-IOC-WMO-IUCN PILOT ACTIVITY ON CORAL REEFS OF THE "LONG-TERM GLOBAL MONITORING SYSTEM OF COASTAL AND NEAR-SHORE PHENOMENA RELATED TO CLIMATE CHANGE"**
 - 9.1 STATUS REPORT BY THE JOINT SECRETARIAT (UNEP-IOC)
 - 9.2 IUCN REPORT ON "MONITORING CORAL REEFS FOR GLOBAL CHANGE"
 - 9.3 POSSIBLE ROLE OF THE TASK TEAM AS ADVISORY GROUP ON MONITORING ACTIVITIES

- 10. FUTURE WORKPLAN OF THE TASK TEAM**
 - 10.1 TIMETABLE FOR THE FINALIZATION AND SUBMISSION OF THE TEXT OF THE OVERVIEW AND THE EXECUTIVE REPORT

- 11. OTHER MATTERS**

- 12. ADOPTION OF THE MEETING REPORT**

- 13. CLOSURE OF THE MEETING**

ANNEX II

LIST OF PARTICIPANTS

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III. OBSERVERS

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ANNEX III

LIST OF DOCUMENTS¹

Document code	Title
WORKING DOCUMENTS	
UNEP-IOC-ASPEI/GTTCR-II/1	Agenda
UNEP-IOC-ASPEI/GTTCR-II/1 Add.	Timetable
UNEP-IOC-ASPEI/GTTCR-II/2	Annotated Agenda
UNEP-IOC-ASPEI/GTTCR-II/3	Summary Report
UNEP-IOC-ASPEI/GTTCR-II/4	List of Documents
UNEP-IOC-ASPEI/GTTCR-II/5	List of Participants
UNEP-IOC-ASPEI/GTTCR-II/6	Draft Report "The Implications of Climate Change for Sustainable Use of Coral Reefs"
INFORMATION/REFERENCE DOCUMENTS	
UNEP-IOC-WMO-IUCN/GCNSMS-II/3	UNEP-IOC-WMO-IUCN Meeting of experts on a Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change: Pilot projects on Mangroves and Coral Reefs, Monaco, 9-13 December 1991
UNEP-IOC-ASPEI/GTTCR-I/3	UNEP-IOC-ASPEI Global Task Team on the implications of Climate Change on Coral Reefs. First Meeting, Guam 27-28 June 1992
UNEP/AIMS	Monitoring Coral Reefs for Global Change. Reference Methods for Marine Pollution Studies No. 61, UNEP 1993 (LCR, ASEAN, AIDAB, IOC, IAEA)
IUCN	Monitoring Coral Reefs for Climate Change
IOC/INF-901	Report of the UNEP-UNESCO-IOC-WMO-IUCN-SPREP-SCOR-CARICOMP-PACICOMP Workshop to organize a co-ordinated network of tropical marine laboratories to monitor reef responses to global change
IOC/GOOS-I/Inf.1	Report of the First Meeting of the UNEP-UNESCO Task Team on the Impact of Expected Climate Changes on Mangroves
IOC/GOOS-I/Inf.2	Pilot Phase of the COOS monitoring scheme for plankton community structure

¹ This list is for reference only. No stock of these documents are maintained, except for the Summary Report.

Document code

Title

INFORMATION/REFERENCE DOCUMENTS (cont'd)

IOC/GOOS-I/Inf.3	Proposed pilot programme for a coastal circulation component of the Global Ocean Observing system
IOC/INF-908	IOC-UNEP-WMO Pilot Activity on Sea Level Changes and Associated Coastal Impacts in the Indian Ocean
IOC/INF-902	Global Ocean Observing System: Status Report on Existing Ocean Elements and Related Systems
SC/IOC-WESTPAC-II/3	Second Session of the IOCUb-Commission for the Western Pacific, Bangkok, 25-29 January 1993
IOC/GE-GLOSS-III/3	Third Session of the Group of Experts on the Global Sea Level Observing System (GLOSS), Paris, 13-15 October 1992

ANNEX IV

FINAL OUTLINE OF
THE IMPLICATIONS OF CLIMATE CHANGE FOR SUSTAINABLE USE OF CORAL REEFS

- I INTRODUCTION
- II CORAL REEFS AND THEIR ENVIRONMENT
 - A. CORAL REEFS
 - B. REEF INTERACTIONS WITH THE ENVIRONMENT
 - C. CORAL REEF COMMUNITY STRUCTURE AND FUNCTION
 - 1. The Coral Reef Community
 - 2. Symbiosis and Reef-Building Corals
 - 3. Macro and Micro-Algae on Reefs
 - 4. The Consumers
 - 5. Bioeroders
 - 6. Plankton
 - 7. Sediment Dwellers
- III HUMAN USES OF REEFS AND THEIR CONSEQUENCES
 - A. HOW PEOPLE USE CORAL REEFS
 - 1. Reefs as Places to Live
 - 2. Reefs as Sources of Food
 - 3. Reefs and Construction
 - 4. Reefs as a Source of Export Income
 - 5. Reefs as Tourist Attractions
 - 6. Reefs as Disposal Sites
 - B. PROJECTED CHANGES IN USE OF REEFS
 - 1. Economically Developing Countries
 - 2. Economically Developed Countries
- IV CLIMATE, VARIABILITY, AND CLIMATE CHANGE
 - A. NATURAL ENVIRONMENTAL VARIABILITY AND REEF STRESS
 - B. WHAT IS CLIMATE?
 - C. NATURAL CLIMATE VARIABILITY
 - D. GLOBAL CHANGE AND CHARACTERISTICS
 - E. GLOBAL CHANGE: PREDICTIONS AND SCENARIOS

V EFFECTS OF CLIMATE CHANGE ON REEFS AND HUMAN USE

A. BACKGROUND

B. EFFECTS OF CHANGES IN ENVIRONMENTAL FACTORS - GENERAL

1. Effects of Sea Level Rise
2. Effects of Increasing Temperature
3. Ocean and Weather-Related Patterns
4. Other Global-Change Factors

C. STRESS INTERACTIONS AND REEF VULNERABILITY

1. Stress Interactions
2. Classes of Reefs and Their Vulnerability

D. DEVELOPING LOCAL ASSESSMENTS AND PREDICTIONS

E. REGIONAL PERSPECTIVES

1. Caribbean and Atlantic Ocean (J. Ogden, C. Birkeland)
2. Pacific - Oceanic and Continental (C. Birkeland, H. Manner)
3. Southwest Pacific and Australia (C. Wilkinson, J. Baker)
4. Southeast Asia (H. Yap, C. Wilkinson)
5. Indian Ocean (M. Fouda, J. Baker)
6. Arabian Gulf and Red Sea (M. Fouda)

VI POLICY AND MANAGEMENT IMPLICATIONS OF CLIMATE CHANGE

A. INTRODUCTION

B. MANAGEMENT STRATEGIES

1. Remove the Causes
2. Assess and Mitigate the Risks of Climate Change

C. PLACING CLIMATE CHANGE RISKS WITHIN POLICY FRAMEWORK

D. MANAGEMENT OPTIONS TO CONSERVE OCEANIC REEFS

1. Reef Islands
2. Reef Ecosystems

E. MANAGEMENT OPTIONS TO CONSERVE FRINGING REEFS

F. MANAGEMENT OPTIONS TO PROTECT HUMAN POPULATIONS

G. MANAGEMENT OPTIONS TO EXPAND THE RESOURCE BASE

H. FINANCIAL CONSIDERATIONS

I. THE PROCESS OF MANAGEMENT

VII REFERENCES

List of boxes for inclusion in various chapters and their authors.

Box Short title	Chapter	Author
Temperature/Bleaching	IV	J. Ogden
Mariculture (clams & other)	V	H. Yap & C. Wilkinson
Pop'n growth, migration	III	H. Manner
Traditional management	VI	H. Manner, C. Birkeland
Role of algae	II	J. Baker
Light IR & UV	II	J. Baker
Time scales, human, processes and cycles	I or II	J. Ogden
Fringing reefs & cays	III	J. Baker
Ecotourism & Maldives	III	J. Pernetta, J. Baker
Plankton	III	C. Wilkinson
Island Groundwater	IV	R.W. Buddemeier
Lime	III	H. Manner, J. Pernetta
Land reclamation, Malé	V	J. Pernetta
Land use practices	II	H. Yap, R.W. Buddemeier
Problems of management	VI	C. Birkeland, C. Wilkinson
Economics and reefs	II	?
Imported materials & island reefs	VI	C. Birkeland
COTS & Temperature	V	C. Birkeland

ANNEX V

LIST OF COUNTRIES AND INSTITUTIONS
HAVING INDICATED AGREEMENT TO PARTICIPATE IN
THE GLOBAL MONITORING OF CORAL REEFS

No.	Country/ Organization	Institute/ Laboratory	Contact Point/Address
1.	Bahrain (State of)	<p>Biology Department</p> <p>Environmental Protection Committee (EPC)</p> <p>Directorate of Fisheries</p>	<p>Dr. Jameel ABBAS Chairman Biology Department College of Science University of Bahrain P.O. Box 32038 Tel: 681234/688316 Fax: 682582 Tlx: 9552 JAMEA BN</p> <p>* Mr. Khalid FAKHRO Vice-Chairman, EPC * Dr. Sami DANNISH Director, Scientific Research Department Bahrain Centre for Studies & Research P.O. Box 496 Manama Tel: 754757 Fax: 754678 Tlx: 9764 BCJR BN</p> <p>Mr. Jassim A. AL-QASEER Director of Fisheries State of Bahrain Ministry of Commerce & Agriculture Directorate of Fisheries P.O. Box 20071 Tel: 729595 Fax: 728459 Tlx: 9171 TEJARA</p>
2.	Barbados	Coastal Conservation Project Unit	<p>The Project Manager Coastal Conservation Project Unit Ministry of Labour, Consumer Affairs & the Environment Oistins, Christ Church <i>[Letter sent by Gayle FRANCIS-VAUGHAN, Chargé d'Affaires a.i., Embassy of Barbados, Brussels, Belgium]</i></p>

No.	Country/ Organization	Institute/ Laboratory	Contact Point/Address
3.	Colombia	<p>Instituto de Investigaciones Marinas (INVEMAR)</p> <p>Instituto Nacional de Pesca y Acuicultura - INPA</p> <p>Fundacion Universidad de Bogota Jorge Tadco Lozano</p> <p>Valle University, Marine Biology Section</p>	<p>Mr. Jaime GARZON-FERREIRA INVEMAR A.A. 1016 Santa Marta Tel: 214413 or 214774 Fax: 211377</p> <p>Marine Biologists: • Ernesto MELENDRO • Nohora GALVEZ INDERENA A.A. 2895, Bocagrande, Cartagena</p> <p>Marine Biologists: • Oscar David SOLANO (Santa Marta) • Pedro LOCOMPTE (Cartagena) • Elvira ALVARADO (Bogota)</p> <p>Fernando A. ZAPATA R. Departamento de Biologia Universidad del Valle Cali <i>[Letter sent by Capt. Jacques CARREIRA COVAREL, Secretary General CCO, Santafé de Bogota]</i></p>
4.	Cook Islands	Cook Islands Conservation Service	<p>Conservation Service P.O. Box 371 Rarotonga Tel: (682) 21256 Fax: (682) 22256 Tlx: SEC FARG 62056</p>
5.	Egypt (Arab Republic of)	<ul style="list-style-type: none"> • Alexandria Institute • Aqaba & Suez Canal Gulf Institute • Red Sea Institute 	<p>National Institute of Oceanography and Marine Science, Ministry of Scientific Research and Technology <i>[Letter sent by Mr. Mohamed Sami ABDEL HAMID Permanent Delegate of Egypt to UNESCO, Paris]</i></p>
6.	Fiji Islands	University of South Pacific (USP)	<ul style="list-style-type: none"> • Prof. Steve WILLAT Head, School of Pure & Applied Sciences & Marine Studies Programme • Dr. Patrick NUN • Ms. Milika NAKASIMA <p>USP P.O. Box 1168 Suva</p>
7.	Germany	Centre for Tropical Marine Ecology (ZMT)	<p>Prof. Dr. Ulrich SAINT-PAUL ZMT Universitätsallee GW1/A D-2800 Bremen 33 Tel: (0421) 218 51 52 Fax: (0421) 218 51 70</p>

No.	Country/ Organization	Institute/ Laboratory	Contact Point/ Address
8.	Israel	Interuniversity Institute for Marine Sciences at Elat (Prof. M. Spira, Scientific Director)	Prof. Yossi LOYA Dean, Faculty of Life Sciences Tel-Aviv University Tel-Aviv
9.	Kenya	Coral Reef Conservation Project	Dr. T. MCCLANAHAN Research Fellow Coral Reef Conservation Project P.O. Box 99470 Mombasa Tel: (254 11) 48 65 49 Fax: (254 11) 47 22 15
10.	Kuwait	Department of Mariculture and Fisheries, Kuwait Institute for Scientific Research (K.I.S.R.)	Mr. Adel AL-SAFAR Department of Mariculture & Fisheries K.I.S.R. <i>[Letter sent by Mr. Sulaiman AL-ONAIZI, Secretary General, the Kuwait National Commission for Education Science and Culture</i> P.O. Box 3266 Safat 13033 Tel: 483 86 35 Ext. 528 Fax: 481 76 65]
11.	Mauritius	Marine Conservation Division	Marine Conservation Division Ministry of Agriculture, Fisheries & Natural Resources <i>[Letter sent by Dr. S. RAGOONADEN</i> Director Meteorological Services St. Paul Road Vacoas Tel: 686 10 31 Fax: 686 10 33 Flx: 4722 METEO IW]
12.	Monaco (Principality of)	Marine Science Station Center of Marine Research (Laboratoire d'Ecologie Expérimentale of Nice University, France)	Dr. Janti QAR Director, Marine Science Station P.O. Box 195 Aqaba, Jordan <i>[Letter sent by Prof. J.M. JAUBERT]</i> Prof. Jean M. JAUBERT Directeur, Centre Scientifique de Monaco Observatoire Océanologique Européen 16 Boulevard de Suisse MC 98000 Monaco Tel: (33) 93 25 89 54 Fax: (33) 93 30 24 74

No.	Country/ Organization	Institute/ Laboratory	Contact Point/ Address
13.	Papua New Guinea	Motupore Island Research Department (M.I.R.D)	<p>Dr. Michael E. HUBER Head, M.I.R.D. Senior Lecturer, Biology Department University of Papua New Guinea P.O. Box 320 University P.O. Tel: (675) 26 09 00 Fax: (675) 26 71 87</p>
14.	Puerto Rico	Department of Marine Sciences of the University of Puerto Rico at Mayagüez	<p>Dr. John KUBARYK Acting Head Department of Marine Sciences RUM-UPR P.O. Box 5000 Mayagüez PR 00681-5000 Tel: 809 832 80 45 Fax: 809 265 28 80</p> <p><i>[Letter sent by Dr. Jorge E. CAPELLA, Research Co-ordinator, Sea Grant College Programs, University of Puerto Rico]</i></p>
15.	Seychelles (Republic of)	Division of Environment "Commission de l'Océan Indien"	<p>Mr. G. TROIAN Director General Environment Division of Environment Ministry of Environment, Economic Planning and External Relations P.O. Box 445 Victoria Mahe Tel: (248) 246 44 Fax: (248) 245 00</p>
16.	Singapore (Republic of)	National Development	<p>The Permanent Secretary Ministry of National Development 5 Maxwell Road, 21/22-00 Tower Block MND Complex Singapore 0108 Tel: (65) 222 12 11 Fax: (65) 322 82 54 Tlx: 34369 NATDEV RS</p> <p><i>[Letter sent by Mrs. Joan TAN-WEE, Executive Office/Infrastructure for Permanent Secretary]</i></p>

No.	Country/ Organization	Institute/ Laboratory	Contact Point/ Address
17.	Solomon Islands		<p>Mr. Moses BILIKI Chief, Environment & Conservation Officer For Permanent Secretary Ministry of Natural Resources P.O. Box C24 Honiara Tel: (677) 215 21 Fax: (677) 212 45</p>
18.	Tanzania (United Republic of)	<ul style="list-style-type: none"> • Zoology Department and the • Institute of Marine Sciences 	<p>Mr. M.A.K. NGOILE Director University of Dar Es Salaam Institute of Marine Sciences P.O. Box 668 Zanzibar Tel: 307 41 Tlg: UNIMARS ZANZIBAR</p>
19.	Trinidad and Tobago (Republic of), W.I.	Institute of Marine Affairs (IMA)	<p>Mr. Richard LAYDOO IMA, Hilltop Lane, CHAGUARAMAS P.O. Box 3160, Carenage Post Office Tel: 634-4291-4 Fax: 634-4433 Tlm: IMA.TRINIDAD.LIBRARY (Omnet)</p>
20.	United Kingdom	Centre for Tropical Coastal Management Studies	<p>Dr. Barbara E. BROWN Director, Centre for Tropical Management Studies University of Newcastle-upon-Tyne Ridley Building Newcastle-upon-Tyne NE1 7RU Tel: 091 222 66 53 Fax: 091 261 11 82 Tlx: 53654 UNINEW G</p>
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No.	Country/ Organization	Institute/ Laboratory	Contact Point/ Address
22.	<p style="text-align: center;">INTERNATIONAL ORGANIZATIONS/ PROGRAMMES</p> <p>Pacific Science Association (PSA)</p>		<p>Dr. L.G. ELDREDGE Executive Secretary PSA P.O. Box 17801 Honolulu, Hawaii 96817 USA Tel: 808-847 35 17 Fax: 808-841 89 68 Tlg: PACSCIENCE Honolulu</p>
23.	<p>South Pacific Regional Environment Programme (SPREP)</p>	<ul style="list-style-type: none"> * East-West Center * Laboratoire d'Etude et de Surveillance de l'Environnement * Institut Français de Recherche Scientifique pour le Développement en Coopération * Marine Laboratory * University of Papua New Guinea * University of South Pacific * Palau's Division of Marine Resources 	<p>Honolulu, Hawaii, USA Fax: 808-944 79 70</p> <p>Papeete, Tahiti, Polynésie Française Fax: 689-43 02 31</p> <p>Noumea, New Caledonia Fax: 687-26 43 26</p> <p>University of Guam, Guam USA Fax: 671-734 67 67</p> <p>Port Moresby, Papua New Guinea Fax: 675-26 71 87</p> <p>Suva, Fiji Fax: 679-30 25 58</p> <p><i>[Letter sent by Mr. Vili A. FUAI'AO Director, SPREP P.O. Box 240 Apia, Western Samoa Tel: 685-219 29 Fax: 685-202 31]</i></p> <p>Sia PATELESIO, Office Assistant SPREP (same address as above)</p>