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Joint Group of Experts on the
Scientific Aspects of Marine Environmental Protection
- GESAMP -

REPORT OF THE TWENTY-SIXTH SESSION

Paris, 25-29 March 1996

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION OF UNESCO
Paris, 1996

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CONTENTS

1. INTRODUCTION

1.1 The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) held its twenty-sixth session at the Intergovernmental Oceanographic Commission in UNESCO House in Paris, France, under the Chairmanship of Mr O. Osibanjo. Ms H. Yap was Vice-Chairperson of the Group.

Opening of the Session

1.2 The Chairman of GESAMP, Mr O. Osibanjo, called the XXVIth session of GESAMP to order at 14.45 hours in UNESCO House.

1,3 The Executive Secretary of IOC, Mr G, Kullenberg, welcomed the participants on behalf of the Director-General of UNESCO and the IOC. He briefly reflected on GESAMP activities 21 years ago, when he was Chairman, noting that in the intervening period, the role the ocean plays in a host of environmental processes has received increasing acceptance, He pointed out that GESAMP can help in addressing a number of these issues.

1.4 The Chairman thanked the Executive Secretary of IOC for his kind welcome and declared the session open.

Adoption of the Agenda

1,5 The Chairman asked the participants if they could adopt the provisional agenda with minor modifications in which the various agenda items would be discussed during the week. With this caveat, the agenda was adopted and is reproduced as Annex I. The list of documents considered in the session is given in Annex II. Participants of the session are listed in Annex III.

2. REPORT OF THE ADMINISTRATIVE SECRETARY

2.1 In presenting his report, the Administrative Secretary of GESAMP, Mr O. Khalimonov, referred to intersessional activities on the subjects which had been considered by GESAMP XXV in order to establish a degree of priority:

review of the state of the marine environment
marine biodiversity and
relations to GEF/STAP.

He suggested that GESAMP should comment on these issues in some detail when the Group comes to the appropriate agenda items.

2,2 The Group was informed of the outcome of the workshop convened in December 1995 by the United Kingdom Government which considered the possibility of formulating a proposal to the Commission on Sustainable Development (CSD) to establish an Intergovernmental Panel on Ocean Issues. The recommendations of that workshop were distributed to all GESAMP sponsoring agencies, They cover a wide range of subjects including GESAMP's "modus operandi" and the ways and means to improve its effectiveness. The Administrative Secretary drew the Group's attention to the fact that there was a wide misconception concerning the role, purpose and achievements of GESAMP. In this respect the group requested the Secretariat to give high priority to strengthen the public's knowledge and appreciation of the role and achievements of GESAMP.

3. EVALUATION OF THE HAZARDS OF HARMFUL SUBSTANCES CARRIED BY SHIPS

3.1 The IMO Technical Secretary informed the Group of the background to the review process carried out during the intercessional period by the GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances carried by Ships in regard to the procedures adopted by GESAMP in 1972 for the implementation of the international Convention for the Prevention of Pollution from Ships, MARPOL 73, now called MARPOL 73/78.

3.2 The reasons to review current procedures were based on the need to harmonize the IMO provisions for maritime transport of dangerous goods with those regulations developed recently within other fora for road and rail and inland water transportation. in this connection, the UN Committee of Experts on the Transport of Dangerous Goods had requested for support in its attempts to establish criteria for environmentally harmful substances, An OECD clearing house had been established to coordinate the efforts in developing harmonized classification criteria, pursuant to the provisions of Agenda 21, Chapter 19.

3,3 The IMO had declared its readiness to take the above developments into account in amending MARPOL 73/78, pending the review of the evaluation procedure adopted by GESAMP. In this regard it established a review panel comprised of experts from national administrations, members of the GESAMP Working Group, and environmental and industrial NGOs. On the basis of the recommendations from that review panel, the GESAMP Working Group at its 31 st session started to review its hazard evaluation rationale, GESAMP was requested to approve the review process as carried out by its Working Group and described in its report (GESAMP XXVI/3). A summary of that report is shown in annex IV.

3,4 Mr P. Wells, Chairman of the Working Group, informed GESAMP that the 31st Session of the Working Group considered both the expert panel's review of the GESAMP evaluation procedures and the regular work of evaluating the hazards of specific chemicals on the basis of data received through correspondence with the chemical industry, as well as new substances proposed by national administrations for bulk carriage by ships, and two special matters i.e. triazine-based herbicides, oestromimetic chemicals.

3.5 The Working Group considered the recommendations of the expert panel and concluded that a new hazard evaluation rationale could be established on the basis of current procedures by re-arranging the order of the hazard profile, adding a number of new criteria, and clarifying descriptions and definitions. There will be six primary criteria : bioaccumulation (log P and BCFs); aquatic toxicity (acute and chronic); acute mammalian toxicity (peroral, percutaneous, inhalation); other adverse mammalian health effects (skin irritation and corrosivity; eye irritation and corrosivity; other adverse health effects); effects on other uses of the sea (beaches, effects due to unique physical/chemical properties, tainting of fisheries products); and biodegradation. Ranking of the criteria would be largely numeric, and the criteria themselves would be reordered in the final profile scheme. The new system, to be further developed in May 1996, will permit chemical evaluations in keeping with the current system (for purposes of not disrupting procedures under MARPOL 73/78) but allow for a more rigorous overall evaluation.

3.6 The Working Group, under regular work, covered 6 items, including a wider distribution of its electronic composite list database, Twenty-two substances from 12 companies were rated, seven important but separate chemical issues were dealt with, and 3 new substances were evaluated. Information on two issues, the use of triazine-based herbicides in antifouling paints and oestromimetic chemicals were considered, The Working Group continues to collect and evaluate these chemicals.

3.7 GESAMP was invited to comment on the Working Group's progress. One member commented on the breadth and relative importance of the criteria under a new column on other adverse health effects, suggesting that this column could be given greater consideration and perhaps numerical ranking due to its importance, Another member expressed the view that it might be difficult to rate substances appropriately if they had high bioaccumulation and rapid biodegradation, though few such substances are currently in the composite list. GESAMP approved the hazard profiles developed by the Working Group at its 31st session.

3.8 Several members proposed that GESAMP should comment on the statement in the Expert Panel Report dealing with the hazards of mixtures, in which Green Peace expressed its concerns about "synergistic effects", The view of GESAMP was that there is much public concern but little evidence of synergistic effects from chemicals and mixtures in the marine environment. In response to questions concerning the purpose of the review efforts, the Chairman also clarified that the revised hazard evaluation scheme was being harmonized with those of other transportation modes (rail and road) and that GESAMP would further be informed as to the final scheme and the

implications of changes in methodologies for particular criteria and assignment of ratings.

3.9 GESAMP endorsed the recommendations concerning the hazard evaluation review and requested the Working Group to continue its work.

4. INTEGRATED COASTAL MANAGEMENT

4.1 The FAO Technical Secretary of the Task Force on Integrated Coastal Management (ICM) reported that since the 25th session of GESAMP, the Task Force held two sessions, from 11 to 15 December 1995 in Oslo and from 12 to 16 February 1996 in Rome. It prepared a document entitled "The Contributions of Science to Integrated Coastal Management" (GESAMP XXVI/4 and GESAMP XXVI/4/add. 1), proposed for approval and publication.

4.2 In introducing the document, Mr S. Olsen, co-chairman of the Task Force, pointed out that GESAMP was fortunate to have obtained detailed case studies from both developed and developing countries that are all mature enough to have entered the implementation stage. He stressed the importance of basing the report on such a diverse body of experience. Mr Olsen commented that much guidance has recently become available on ICM but that none has so fully addressed the challenges posed by the interactions between science and resource management. The case studies are the first time that global experience specifically on the contributions of science to ICM has been presented to the international audience, Mr Olsen went on to stress that the draft report is not a review paper but is nonetheless fully consistent with recent statements by UN agencies and with Chapter 17 of Agenda 21 of UNCED on the objectives, scope and structure of ICM.

4.3 In the ensuing discussion, the Group provided numerous technical and editorial comments and suggestions on the report. Main discussion points focussed on the clear identification of the audience to which the document is addressed; the need for a clear statement of the importance of public participation in the ICM process; a clarification that ICM is a process for society to choose between options offered.

4.4 It was further noted that in contrast to information on contributions from natural science to ICM, there is less detail on specific inputs from social sciences. Also, some reference to institutional structures for the ICM process would be welcome. Proposals for amendments to the report were handed in to the Co-Chairmen who in turn, during the course of the session, presented to the Group a revised version of the document (GESAMP XXVI/4/Rev. 1). With these amendments included, the Group approved the document for publication as GESAMP Reports and Studies No.61 , The Executive Summary as well as the Contents Table of the document are included in Annex V to this Report.

5. MARINE BIODIVERSITY

5.1 The Administrative Secretary of GESAMP introduced the agenda item. He reminded the Group that UNEP had proposed the establishment of a GESAMP Working Group on Marine Biodiversity at the twenty-fifth session of GESAMP by presenting a background paper. However, the Group considered that the establishment of a full scale GESAMP Working Group was not warranted at that time. GESAMP accepted Mr J. Gray's offer to prepare a peer-reviewed 12-15 page document covering the geographical distribution of marine biodiversity, the key regions and/or habitats, the threats to marine biodiversity (including exploitation of living resources) and what strategies need to be adopted to best conserve marine biodiversity.

5.2 Mr Gray introduced his paper: "Marine Biodiversity: patterns, threats and development of a strategy for conservation" (GESAMP XXVI/5). GESAMP was requested to consider the paper with a view to approval for reproduction and distribution. GESAMP was also invited to consider the possibility of Its future work in this field.

5.3 The Group approved the paper for publication in the GESAMP Reports and Studies series. Mr Gray was requested to edit and update certain parts of the paper as identified by the Group, The IMO Technical Secretary offered to arrange for publication as Reports and Studies No.62.

5.4 Discussing the future activities which may be undertaken by GESAMP in this field the Group considered that the potential of GESAMP was not fully used. While documents GESAMP XXV/9.2 (see also Annex IX to the Report of the Twenty-Fifth Session of GESAMP - GESAMP Reports and Studies No. 56) and GESAMP XXVI/5 (substance of which will be published) meet some urgent needs of the international community and agencies concerned, GESAMP noted that marine biodiversity is receiving little attention relative to terrestrial biodiversity. The recent Global Biodiversity Assessment (GBA) has not redressed this imbalance. Furthermore, the marine biodiversity component of the GBA did not discuss the threats to marine biodiversity nor the actions that should be taken to address these threats.

5.5 GESAMP is concerned that much of the focus on marine biodiversity is directed at the deep sea, Whilst it is clearly of scientific interest to ascertain how many species occur in the deep sea, this is not an urgent problem relative to the threats that exist to coastal diversity. However, GESAMP recognizes the need in the future to study the expansion into deeper waters of oil and gas exploration on biodiversity. Clearly, it is of scientific interest to increase the knowledge base concerning sea-bed biological diversity and to resolve issues concerning exploitation; at the same time GESAMP feels that the most urgent threats concerning marine biodiversity loses are in coastal areas.

5.6 Habitat (and landscape) diversity in the sea is highest in coastal areas such as coral reefs, mangrove forests, seagrass beds, kelp forest and hard and soft substrata. Globally coastal habitats are under increasing and severe threats from physical destruction, fragmentation and degradation. Yet human populations, particularly in developing countries are dependent on intact habitats for sources of food, protection from flooding, processing of wastes etc. GESAMP urges governments and international organizations to take immediate action to conserve coastal habitats for the sustainable benefit of future generation particularly through making their conservation of specific objective of integrated coastal management programmes.

5.7 The theoretical understanding of key issues relating to the development, maintenance and restoration of marine habitats is inadequate and research and training of personnel is urgently needed. Similarly GESAMP supports initiatives to increase the number of trained taxonomists especially in developing countries.

The GESAMP priorities for action are, inter alia:

i) research into the development, maintenance and restoration of key coastal habitats;

ii) assessments of the scale of destruction of coastal habitats;

iii) development of strategies for the conservation of coastal habitats as parts of integrated coastal management programmes;

iv) studies of effects of commercial fishing on coastal and marine biodiversity and

v) development of methods for rapid assessments of coastal biodiversity

5.8 It was agreed that Mr J. Gray's paper on marine biodiversity together with a letter expressing GESAMP's concerns would be sent to the Secretariat of the Convention on ecological Diversity and raised in other fora such as the World Conservation Congress of IUC, Montreal, October 1996) and the Commission on Sustainable Development. In addition, GESAMP will continue to keep the marine biodiversity issue under review within the preparation of the States of the Marine Environment" report planned for 2002. (See section 6.).

5.9 The Technical Secretaries of IOC and UNEP agreed to undertake intersessional work on this issue and to present relevant proposals for the next session of GESAMP.

6. PROVISIONS AND ARRANGEMENTS FOR A REVIEW OF THE STATE OF THE MARINE ENVIRONMENT (GESAMP 2000 STATUS REPORT)

6.1 The UNEP Technical Secretary introduced a paper (GESAMP XXVI/6/2) containing a proposal for GESAMP to contribute to the preparation of a global review assessing land-based sources and activities affecting the quality and uses of the marine, coastal and freshwater environment. The paper contained specific suggestions regarding the role of GESAMP and the mode and manner in which it might contribute to the preparation of such a review pursuant to the requirements of the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (1 995).

6.2 UNEP pointed out that more than 100 governments participating in a Conference held in Washington, DC (23 October-3 November 1995) adopted the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, and designated UNEP as Secretariat of the Programme, with the task of facilitating its implementation at the national, regional and global levels, The Conference also requested UNEP to prepare a proposal for implementing the institutional arrangements and the Global Programme of Action, The proposal, prepared by UNEP and reviewed during three consultations in late January-early February 1996 (with agencies, governments and non-governmental organizations), was submitted to, and was welcomed by the Inter-sessional Ad Hoc Working Group on Sectoral Issues of the Commission on Sustainable Development (New York, 26 February-1 March 1996).

6.3 UNEP's proposal envisages, inter alia, an activity highly relevant to GESAMP, i.e., preparation of periodically updated reviews assessing land-based sources and activities affecting the quality and uses of the marine, coastal and associated freshwater environment, including the identification of "hot spots" and impacts of land-based activities requiring priority action, as well as activities undertaken to achieve them. The proposal envisages a major role for GESAMP in preparing the global review and in guiding the preparation of regional reviews upon which the global review will be based.

6.4 The Chairman asked Prof Woods, who had been invited to attend GESAMP XXVI as observer in his role as Chairman of the International Waters' Working Group of the Scientific and Technical Advisory Panel to the Global Environment Facility (GEF), to comment on the support that Global Environment Facility (GEF) might provide for a review of the state of the marine environment. Prof Woods noted that International Waters (IW) is one of the four themes addressed by the GEF, the others being climate change, loss of biodiversity, and ozone depletion. It includes all aspects of the ocean, including estuaries, coastal water, shelf seas and the open ocean, as well as lakes and rivers. At its last meeting, GEF-STAP identified the need for an over-arching International Waters Assessment, to provide the scientific underpinning for future prioritization of GEF/IW Projects, in the same way that existing assessments do for the other three sectors. The STAP has formally proposed such an IW Assessment to GEF Council which will meet in April, 1996. In doing so it recognized the existence of other groups assessing particular aspects of IW, including GESAMP, and SCOPE which is planning to assess the state of scientific understanding related to problems of the ocean environment and their solution. If there is to be an International Waters Assessment, accepted by governments as meeting the needs of GEF, the Assessment process will probably involve collaboration between these groups. A first step in that direction might be to hold a meeting of representatives of bodies that could contribute to an over-arching IW assessment, in order to identify the potential contributions of each, areas of overlap and gaps, and to explore possible mechanisms for integration and the implications for funding and secretariat support.

6.5 The 1990 GESAMP report on the State of the Marine Environment (GESAMP Rep. Stud. 39) is widely acknowledged to have been a very influential document for a number of major intergovernmental fora, and particularly for the preparation of Chapter 17 of Agenda 21, The 1990 assessment has also highlighted the expectations of the international community that there should be regular and updated scientific reviews and assessments. At its XXVth session, the Group discussed this issue of ensuring' a contemporary and coherent analysis of the state of the marine environment to underpin the development of policies and programmes relating to marine environmental protection and the sustainable use of marine and coastal resources. In doing so, the

Group stressed that the preparation of periodic reviews and assessments of the state of the marine environment and identification of problems and areas requiring special attention was the fundamental mandate of GESAMP (see report of the XXVth session, GESAMP Rep. Stud. 56, paragraphs 8.3 to 8.10). As a multi-disciplinary body, its other main function is to provide advice relating to the scientific aspects of marine environmental protection in respect to specific questions and particular problems posed or referred to it by its sponsoring organizations (see Annex 3 of GESAMP Rep. Stud. 53).

6.6 For the 26th session, general guidance on the desired scope and content of the next comprehensive State of the Marine Environment was given by several sponsoring organizations; this guidance paid particular attention to the requirements of Agenda 21 and thus to such additional issues as marine and coastal biodiversity and integrated coastal management, which were not covered, or covered adequately in the 1990 assessment. These suggestions were considered by a drafting group established to prepare Terms of Reference for a Working Group on Marine Environmental Assessments, as an ongoing activity of the Group. It had already been acknowledged at the previous session that the basic concepts to be adopted, and the approach to be used, in preparing the next assessment would need revision. The drafting group was also asked therefore to consider a range of problems associated with this enormous undertaking, not the least of which was the necessary interaction between assessment activities at the global and regional levels,

6.7 It was readily acknowledged, especially given the findings of the 1990 assessment and subsequent environmental trends around the world, that marine environmental impacts from land-based activities would also make up the bulk of the work required for the next comprehensive assessment, The Group noted that the Washington Global Programme of Action for the Protection. of the Marine Environment from Land-Based Activities (UNEP(OCA)/LBA/lG.2/7, annexed to GESAMP XXVI/6/2) called for "scientific assessments regarding land-based impacts on the marine environment" from "relevant scientific organizations and institutions, including GESAMP". Thus it is also implicitly recognized that here is a need to improve confidence in the reliability of scientific evaluations and predictions. It was further affirmed by the sponsoring organizations that an appropriate response from GESAMP in this regard would be an important component of their obligation to the implementation of the Global Plan of Action.

6.8 The discussion on this aspect of the work of the proposed Working Group on Marine Environmental Assessments was based on a preliminary outline for a global review of impacts from land-based sources and activities prepared by UNEP which provides the secretariat for the Programme. In submitting its request for GESAMP to review this outline in terms of the potential contribution of the Group, UNEP emphasized the importance of completing the work involved in 1998.

6.9 The Group stressed that the task of preparing a report for UNEP should be integrated into the much more broad and long-term programme of a Working Group dealing with all aspects of marine environmental assessments from the underlying science to the production of regional and global reports.

6.10 The timing of the work on land-based impacts, when associated also with such other possible assessment needs of GESAMP as suggested, for example, but the designation by UNESCO/IOC and the UN General Assembly of 1998 as the International Year of the Oceans, and the formulation of a new and revised Strategy for GEF's International Waters component, points to the need for yet greater efforts to find the most appropriate scope, content and modality for the next major assessment of the state of the marine environment, as well as the main component dealing with land-based impacts. The recommendations submitted by the drafting group represent a first attempt to address these problems.

6.11 Accordingly, GESAMP recommends that a standing Working Group on Marine Environmental Assessments be established to:

keep under continuous review the condition of the marine environment on regional and global scales and to report on a regular basis on any minor changes, apparent trends and

emerging issues and explore the possibilities for the increased use of environmental change indices;

prepare substantive updates of the State of the Marine Environment at intervals of approximately a decade;

respond to specific requests from the sponsoring agencies to provide more focussed, or interim, assessments as required; and

assist regional organizations in the preparation of regional assessments in accordance with GESAMP Guidelines for Marine Environmental Assessment (GESAMP Reports and Studies No. 54) and improving the scientific basis for such assessments.

6.12 **GESAMP recommends the following Terms of Reference for this Working Group:**

6.12.1. **To undertake major periodic assessments of the condition of the marine environment[1] with emphasis on the effects of, and threats posed by, anthropogenic activities at approximately decadal intervals; a report on 'Land-based Sources and Activities Affecting the Quality and Uses of the Marine, Coastal and Associated Freshwater Environment' will be a first step towards the next periodic assessment of the 'State of the Marine Environment';**

6.12.2. **To develop scientific approaches for improving the reliability, comprehensiveness and utility of periodic assessments in the context of the expectations of the international community for broader geographical coverage, dealing with:**

new concerns and perspectives;

improved insights regarding trends;

the social and economic consequences of impact on the marine environment, its resources and amenities and vice versa;

6.12.3. **To specify actions, including the adoption of new scientific and innovative approaches for the sustainable protection and development of the marine environment, its resources and amenities within the context of existing and planned international and regional agreements;**

6.12.4. **To promote, and keep under review, the conduct of regional assessments and to provide scientific and technical guidance that will facilitate improved global assessments;**

6.12.5. **To search for and apply scientifically-valid indices of environmental condition that could be used to monitor environmental trends;**

6.12.6. **In relation to the next periodic assessment of the State of the Marine Environment (SOME 2002), carry out the following tasks:**

i) **Define the current state (physical, chemical, biological) of the marine environment based on contemporary information;**

ii) **Identify and evaluate fluxes from activities potentially affecting the marine environment and the underlying mechanisms;**

iii) **Analyze existing impacts on the marine environment, its resources and amenities, resulting from anthropogenic activities;**

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[1] **'marine environment' encompasses both coastal and marine environments.**

iv) **Analyze the nature and scale of contemporary effects on the marine environment, its resources and amenities, and evaluate their ecological, social and economic significant;**

v) **Identify new anthropogenic activities and determine the nature and magnitude of threats posed to the marine environment;**

vi) **Assess the social and economic consequences, on both regional and global scales, of impacts and threats to the marine environment, its resources and amenities, and opportunities for their mitigation or remediation.**

6,12.7. To undertake interim assessments in response to emerging issues and concerns regarding the condition and viability of the marine environment building on, and in the context of, the preceding GESAMP periodic assessment.

6,13 In the light of the commitments of UNEP relating to the Global Programme of Action, the Group requested that the sponsoring agencies should, without delay, nominate both the Chairman of this Working Group and a small number of GESAMP members to serve on the Working Group. This would facilitate an immediate task that needs to be accomplished within 2 months to ensure that the UNEP request can be satisfied. This early task will be to prepare, if necessary by correspondence, instructions to the regions regarding information requirements for assessing land-based activities that are different from, or in addition to, those outlined in the GESAMP Guidelines on Marine Environmental Assessment. Some topics indicated in the outline of the global review of land-based sources and activities to be undertaken by UNEP, such as a detailed consideration of immediate impacts on the freshwater environment and the effects of degradation on food security and cultural issues would fit into this category. It is implicit also that the range of disciplines on the Working Group must correspond to the agreed scope of the GESAMP assessment.

6.14 In relation to the request from UNEP concerning the preparation of a report on Land-Based Sources and Activities Affecting the Quality and Uses of the Marine, Coastal and Freshwater Environment (LBA report), the Group considered the structure of such report that it could prepare within the allocated time frame, taking into account UNEP's proposal (GESAMP XXVI,6.1 /Add. 1). In this connection the Group recalled, however, that it has no remit to cover the freshwater environment apart from the influences of freshwater runoff on the coastal and marine environment. Additional advice on the impact of land-based activities on freshwater environments would have to be provided. In response to UNEP's request that "food security and poverty alleviation" shall be covered, as well as "economic and social uses and benefits, including cultural values", the Group pointed out that these issues could only be addressed on the basis of specialized information and assessments to be initiated by UNEP from its regions.

6,15 The Group further drew attention to the difficulties of demonstration trends in environmental conditions due to anthropogenic influences. Based on previous experience of the 1990 GESAMP report on the State of the Marine Environment and subsequent regional assessment, it is unlikely that it will be possible to detect trends with currently available environmental datasets, except in exceptional circumstances. However, the long-term plan of action should deal with the problems of trends. In this regard, simplistic indices have not been found to be useful to date.

6.16 The inaugural meeting of the full Working Group should be held during mid-1996 to formulate a work programme and associated priorities, including a timetable. The Working Group will clearly have to determine how to address the immediate task of the assessment requested by UNEP. However, the latter task should be carried out within the larger context of the continued preparation of periodic assessments. It may therefore be appropriate for the assessment of land-based activities requested by UNEP to be assigned to a sub-group of the Working Group.

6.17 The Group understands that the next major periodic assessment will be a long term and costly undertaking that places considerable responsibility on GESAMP and requires, inter alia, broad participation from the scientific community and from numerous regional and global

organizations, as well as coordinated planning with any other relevant assessments undertaken at the international level. The effort required may be comparable with that required for assessments of climate change.

6.18 The Group therefore strongly stressed that such an undertaking can only be properly launched and carried forward if adequate financial resources are made available and that there would be a long-term commitment on the part of the experts and organizations concerned.

6.19 An early and urgent consideration of the Working Group and sponsoring agencies should be to establish efficient mechanisms for the identification, acquisition, review, management and distillation of information pertinent to the State of the Marine Environment report. These mechanisms would embrace the identification of key sources and contacts within and outside the Regional Seas Programme, where essential global and regional information and assessments are available. The Working Group should also consider the process whereby the necessary Information can be transferred and received, preferably electronically, as well as indexed, cross-referenced, quality controlled, stored and rapidly accessed.

7. MATTERS OF Particular CONCERN REGARDING THE DEGRADATION OF THE MARINE ENVIRONMENT

A. Effects of Fishing

7.1 Whilst much attention is being given to over-exploitation of living marine resources GESAMP is concerned that environmental effects of fishing are neglected. For example, in the North Sea, one of the most heavily exploited marine fisheries, it is suggested that the whole seabed below 10m is trawled over twice a year and many areas up to 6 times. The gear used is getting heavier over time and with modern technological aids there are no longer trawl-free refuges The sediment and its living communities are severely disrupted by these activities and significant alterations in communities have resulted such as destruction of echinoderms, sponges and bivalve molluscs, It has been demonstrated that biogeochemical cycling of elements and organic material have been altered in unpredictable ways,

7,2 Other consequences of over-exploitation and fishing for selected species are alterations of ecosystem feeding relationships. An example is over exploitation of a migrating large herring stock resulting in a large increase in the food for herring, copepods, with consequences for bottom-living fish such as capelin. Over-exploitation in one sea leads to effects in other seas.

7,3 Selected exploitation of one species means that large quantities of bycatch are returned to the sea which has in turn led to dramatic changes in the structure and functioning of the benthic system, and the system as whole.

7,4 The limited evidence available suggested that these problems are global and of such a scale that in some localities they may outweigh environmental effects of contaminant discharges in terms of their ecological significance. GESAMP urges that appropriate international and national organizations initiate wide-ranging studies on the effects of commercial fishing on the marine environment as a matter of urgency, in line with relevant articles on fisheries management fishing operations and fishery research of the Code of Conduct for Responsible Fishing adopted by consensus on 31 October 1995 by the FAO Conference.

7,5 A practical method of assessing the effects of fishing intensify on benthic communities is the creation of exclusion zones. However, due to lack of funding and conflicts of interests between the fishing community and administrations, few, if any such experiments have been carried out. GESAMP considers creation of exclusion zones as control areas for assessing the effects of commercial fishing a high priority and urges governments through the technical secretaries of its sponsoring organizations to take appropriate action.

B. Phytotoxins

7,6 Given the global increase in report of phytotoxin occurrences and human exposures, GESAMP draws attention-to the need for expanded research and monitoring directed at the health and resource impacts of such occurrences.

7.7 These impacts can be characterized, generally, as:

direct human health concerns:

attendant reductions in resources value resulting from fishing closures due to human health risks; and,

possible impacts in the health of other marine life (particularly marine mammals, birds and reptiles).

7.8 GESAMP is particularly concerned about whether thresholds exist for adverse effects and, where such thresholds do not exist, the scale of risks and nature of adverse effects that are associated with chronic exposures.

7.9 GESAMP urges, therefore, that a more determined and systematic international effort be directed at both acute and chronic risks attributable to phytotoxin occurrence.

c. Indicators and Methodologies for Assessing the Progress of Coastal Management programmes

7.10 GESAMP is aware of the proliferation of coastal management programmes and projects, particularly in developing nations. One recent inventory suggests that the number of projects approaches 200. These are 'being sponsored by a variety of organizations, and are being carried out at a wide range of scales and in a diversity of environmental and social settings.

7,11 There is an urgent need for an accepted evaluation methodology for assessing the impacts of coastal management programmes so that their efficacy can be assessed and required changes identified and implemented. Indicators and methodologies are required for establishing timely baselines and appropriate monitoring and assessment programmes. When an evaluative framework is in place it will be possible to document trends, identify their likely causes and objectively estimate the relative contributions of integrated coastal management (ICM) programmes to observed social and environmental change.

7.12 The GESAMP report on the contributions of science to ICM contains much of the information required for developing an evaluative framework and provides a basis for identifying the necessary indicators. Indicators and methodologies should be developed for assessing the impacts of coastal management upon:

i) **the quality of life of coastal communities, and**

ii) **the condition of the natural environment.**

D. Progress of the International Arctic Seas Assessment Project (IASAP).

7.13 At the 23rd session of GESAMP, concerns were raised about the consequences of the pervious dumping of radioactive waste in shallow waters of the Arctic marine environment. In this context it should be noted that the IAEA launched, in 1993, the International Arctic Seas Assessment Project, IASAP, to address these concerns. Although the project is not yet complete, it is now clear that contemporary risks to the environment and human health are insignificant. The project is now focussing on the future threats posed by the dumped high level radioactive waste as a result of gradual degradation of the spent nuclear fuel contaminants and as an examination of the feasibility of remedial actions to reduce future risks. The conclusions of the Project will be presented at the 27th session of GESAMP.

8. FUTURE WORK PROGRAMME

8.1 The Executive Secretary of IOC addressed the question of storing excess carbon dioxide in the deep ocean (GESAMP XXVI/8. 1), He noted that the document actually was a composite of several smaller documents being provided by both IOC and IMO, He further noted that although the IPCC has indicated that there will be a temperature increase and a resulting sea level rise as a consequence of climate change, other matters regarding oceans and climate change have not been assessed by IPCC, He pointed out that the IOC has convened several meetings of scientific and technical experts on oceans and climate. The last of these in particular considered the ocean-atmosphere interaction of CO_2, and ocean processes influencing the CO_2 budget. He further recalled that the IOC has been invited to this task in Chapter 17 of Agenda 21,

8.2 The IMO Technical Secretary informed the Group that the Consultative Meeting of Contracting Parties to the London Convention in 1992 requested its Scientific Group to keep under continuing review the results of R & D projects carried out in relation to the disposal of CO_2 at deep sea, Recently adopted amendments to the London Convention 1972 which entered into force in 1994 prohibit the dumping at sea of CO_2 as industrial waste. A variety of potential impacts and environmental effects had been listed in the IMO documentation that IOC included in its submission (GESAMP XXV/8.1) to this Group. Additional information is also being collected by IMO for future review. In the light of the many scientific uncertainties IMO would support IOC in its request to GESAMP to synthesize the available material, at this stage preferably by a small expert group working by correspondence, pending the views of the Group on this matter.

8.3 The Group discussed whether or not an assessment of the problem should be made. It was stressed by several participants that if it is concluded that such an assessment be made, it should be accomplished in a step-wise process: first look at available information, and then if the assessment looks feasible, proceed.

8.4 The Group noted there were important legal and socioeconomic sensitive issues relating to this topic, but it was concluded that these should not present a barrier for GESAMP conducting a feasibility study and develop a view.

8.5 It was agreed that a small intersessional correspondence group be formed to address the issue. Mr. M. Bewers accepted the request to coordinate the work and Mr. D. Elder was invited to participate as a GESAMP Member. Both IOC and IMO would support the work, It is envisaged that one invited expert will prepare a draft overview which will be evaluated by the group through correspondence. No separate meeting is envisaged at this stage. The draft document will be made available at the next session of GESAMP for its consideration and advice on any further steps to be taken.

8.6 Intercessional Work

8.6.1 Taking into account the above decisions of the Group, intersessional work will be carried out in the framework shown below:

1. Evaluation of the hazards of harmful substances carried by ships (Working Group 1)

Lead Agency	IMO
Co-sponsor	UNEP
Chairman	P. Wells
Member	T. Bowmer

A meeting of the Working Group will be held from 20 to 24 May 1996 to continue the review of the GESAMP evaluation procedure and to evaluate new substances proposed for transport by ships.

2. Environmental impacts of coastal aquiculture (Working Group 31)

Lead agency	**FAO**
Co-sponsors	**UNEP, UNESCO-IOC, WHO**
Chairman	**R. Gowen**

A meeting of the Working Group will be held in May 1996,

3. Storage of CO_2 in the deep sea (Correspondence Group)

Lead Agency	**UNESCO-IOC**
Co-Sponsor	**IMO**
Coordinator	**M. Bewers**
Member	**D. Elder**

The Group will prepare a synthesis document for consideration at GESAMP XXVII.

4. Review of the state of the marine environment (Working Group 26)

Lead Agency	**UNEP**
Co-Sponsor	**IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN**
Co-Chairmen	**0. Osibanjo and S. Keckes**
Members	**P. Boelens, R. Duce, D. Elder**

A meeting will be convened 'from 17 to 18 May 1996 in Geneva to review the terms of reference considered above, to continue consideration of provisions, arrangements and logistics.

9. OTHER MATTERS

9.1 Mr J, Gray, who is leaving GESAMP this year, wished to record his thanks and appreciation to members, the agencies and secretariat for a rewarding and exciting period of membership.

9.2 He expressed his concern about the decline in the number of members of GESAMP from a maximum of 26 to this year's 13 members. He urged that the agencies appoint members for fixed periods of time so that they can better contribute to the long-term functioning of GESAMP. A longer term appointment period could allow better consideration of disciplinary coverage and also enable work to be done inter-sessionally, outside Working Groups which is not possible with the present arrangements.

9.3 Finally, he expressed concern about the demands on time expected in relation to the State of the Marine Environment report which were considerable and had, in his view, been grossly underestimated.

9.4 He asked that these matters be considered at the Inter-Secretariat meeting to follow GESAMP XXVI.

9.5 A number of GESAMP participants and Technical Secretaries responded thanking Mr Gray for his intervention and strongly supported it, all noting that a review of current arrangements was needed.

10. DATE AND PLACE OF THE NEXT SESSION

10.1 The Group noted that the twenty-seventh session of GESAMP will be hosted by the United Nations Environment Programme at its Headquarters in Nairobi, Kenya, from 14 to 18 April 1997.

11. ELECTION OF CHAIRPERSONS

11.1 The Group unanimously elected Ms H. Yap as Chairperson and Mr P. Wells as Vice-Chairman for the next intersessional period and the twenty-seventh session of GESAMP.

12. REPORT OF THE TWENTY SIXTH SESSION:

12,1 The report of the twenty sixth session of GESAMP was considered and adopted by the Group on the last day of the session. It contains in Annexes I to VI summaries of reports prepared by Working Groups and other sub-Groups. The summaries are included for information and were not considered by the Group with a view to approval,

12.2 The twenty-sixth session was closed by the Chairman of the Group at 13,30 on 29 March 1996.

Annex I

AGENDA

1. Adoption of the provisional agenda
2. Report of the Administrative Secretary
3. Evaluation of the hazards of harmful substances carried by ships
4. Integrated coastal area management
5. Marine biodiversity
6. Provisions and arrangements for a review of the state of the marine environment (GESAMP 2000 status report)
7. Matters of particular concern regarding degradation of the marine environment
8. Future work programme
9. Other matters
10. Date and place of next session
11. Election of Chairpersons
12. Report of GESAMP XXVI

Annex II

LIST OF DOCUMENTS

Agenda Item	Document	Submitted by	Title
1	GESAMP XXVI/1	Admin. Sec.	Provisional Agenda
3.	GESAMP XXVI/3	IMO	Evaluation of the Hazards of Harmful Substances carried by ships
4.	GESAMP XXVI/4	FAO	Report of the Task Force on Integrated Coastal Management (WG 32).
4.	GESAMP XXVI/4.Add.l	FAO	Report of the Task Force on Integrated Coastal Management (WG 32), Executive Summary
4.	GESAMP XXVI/4.Rev.1	FAO	Revised Report of the Report of the Task Force on Integrated Coastal Management (WG 32).
5.	GESAMP XXVI/5	Admin. Sec.	Marine Biodiversity - Intercessional Activities
6.	GESAMP XXVI/6.1	Admin. Sec.	Provisions and Arrangements for a Review of the State of the Marine Environment (GESAMP 2000 status report)
6.	GESAMP XXVI/6.2	UNEP	Proposal for establishment of a GESAMP Workshop Group on the State of the Marine Environment
6.	GESAMP XXVI/6/add.1	UNEP	Land-Based Sources and Activities Affecting the Quality and Uses of the Marine Coastal and Associated Freshwater Environment
6.	GESAMP XXVI/6/Inf.1	UNEP	Report of the Intergovernmental Conference to Adopt a Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities, Washington, D.C. 23/1 0-3/1 1 /95

6.	GESAMP XXVI/6/Inf.2	UNEP	Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities
	GESAMP XXVI/6/Inf.3	UNEP	Proposal - Institutional Arrangements and implementation of the Global Programme of Action for the Protection of the Marine Environment from Land Based-Activities
	GESAMP XXVI/8.1	IOC	Carbon Dioxide Storage in the World Ocean

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ANNEX IV

EVALUATION OF THE HAZARDS OF HARMFUL SUBSTANCES CARRIED BY SHIPS

Summary of the report of the thirty-first session for the Working Group (Working Group 1)

Introduction

1. The Working Group held its thirty-first session at IMO Headquarters, London, from, 28 August to 1 September 1995 under the Chairmanship of Mr P.G. Wells.

2. the Working Group devoted most of the work during the 31st session to a review of the current procedures for the evaluation of the hazards of harmful substances carried by ships, which had been used since the early 1970s and were part of the terms of reference of the Working Group. At the request of IMO's Marine Environment Protection Committee, an expert panel had met before to prepare recommendations to the Working Group, taking into account scientific findings, research, development and experience gained with the existing procedures.

Bioaccumulation

3. The Working Group agreed that the current qualitative bioaccumulation rating should be replaced by a numerical ranking system reflecting bioaccumulative tendencies based on information on the long octanol/water partition coefficient (log Pow) of a substance, and on information on bioconcentration in fish, represented by the bioconcentration factor (BCF).

Aquatic toxicity

4. The Working Group agreed that in addition to rankings based on results from acute aquatic toxicity tests, from substances with high hazards regarding the acute toxicity, bioaccumulation and persistence, information on their chronic toxicity should be included.

Biodegradation

5. The Working Group emphasized that results of biodegradation tests would be indicative of the ability of a substance to degrade in the marine environment. Accordingly, a new column should be incorporated in the hazard profile, indicating whether or not a substance was readily biodegradable.

Mammalian toxicity

6. The Working Group developed a rating scheme for indication of peroral, percutaneous and inhalation toxicities, as well as ratings for skin irritation and corrosivity, from eye irritation and corrosivity, and other adverse health effects.

Interface with other uses of the sea

7. The original column concerning "beaches" should be extended to include rating on potential effects in regard to:

tainting of fisheries products;

hindrance of coastal amenities;

hazards to marine wildlife and effects on benthic habitats due to specific physical properties of the substances.

Other work

8. **The Working Group evaluated a number of substances for which data had been submitted intercessionally by the chemical industry, maritime administrations, and members of the Working Group.**

Terms of reference

To examine and evaluate available date and to provide such other advice as may be requested, particularly by IMO, for evaluating the environmental hazards of harmful substances carried by ships, in accordance with the rationale approved by GESAMP for this purpose.

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Annex V

THE CONTRIBUTIONS OF SCIENCE TO INTEGRATED COASTAL MANAGEMENT

Executive Summary, Rep.Stud.GESAMP, (61)
(Task Force)

1. **In this report, GESAMP draws on experience from programmes in different geographic and socioeconomic settings to identify how science and scientists can contribute to the effectiveness of Integrated Coastal Management (ICM).**

2. **The goal of ICM is to improve the quality of life of human communities who depend on coastal resources while maintaining the biological diversity and productivity of coastal ecosystems. Thus, the ICM process must integrate government with the community, science with management, and sectoral with public interests in preparing and implementing actions that combine investment in development with the conservation of environmental qualities and functions.**

3. **in the opinion of GESAMP, successful ICM programmes will involve:**

   a) **public participation whereby the values, concerns and aspirations of the communities affected are discussed and future directions are negotiated;**

   b) steps by **which relevant policies, legislation and institutional arrangements (i. e., governance) can be developed and implemented to meet local needs and circumstances while recognizing national priorities;**

   c) **collaboration between managers and scientists at ail stages of the formulation of management policy and programmes, and in the design, conduct, interpretation and application of research and monitoring.**

4. **From its consideration of existing experience on ICM structures and procedures, GESAMP has derived a conceptual framework to identify for each stage in the management process, the necessary contributions from natural and social scientists. GESAMP recognizes that progress towards sustainable forms of coastal development will be achieved by ICM programmes that cycle repeatedly through the stages of the management process. Each cycle may be considered a generation of an ICM programme.**

5. **It is clear that the management of complex ecosystems subject to significant human pressures cannot occur in the absence of science, The natural sciences are vital to understanding ecosystem function and the social sciences are essential to elucidating the origin of human-induced problems and in finding appropriate solutions. The** need to design **studies in accordance with clearly-stated objectives is particularly important. Scientific techniques and procedures that are particularly useful to ICM include resource surveys, hazard and risk assessments, modelling, economic evaluations and analyses of legal and institutional arrangements. Scientific support is also needed in the selection of management control measures and in preparing material for public information and education.**

6. **Despite great differences in the social, economic and ecological conditions in the countries** from **which the four case studies were drawn, there is remarkable consistency in the lessons learned about the contributions of science to ICM, They demonstrate that scientists and managers must work together as a team if scientific information generated for ICM is to be relevant and properly applied for management purposes. Since the two professions have different perspectives and Imperatives and approach the solution of problems differently, the objectives and priorities for programmes must be derived, tested and periodically re-evaluated by scientists and managers working together.**

7. **GESAMP recognizes the need to build constituencies for ICM initiatives and the importance of matching policies and management actions to the capabilities of the institutions involved. Some countries experiencing severe coastal degradation and where remedial measures are urgently required, may not have the necessary frameworks for environmental management and must focus much of their effort initially on creating the institutional context in which effective resource management can occur.**

Terms of Reference

(i) to **present a concise description of the structure of ICM emphasizing** its scope **and objectives,**

(ii) to **identify and evaluate the scientific elements (social and natural) required** to support the **stages of the ICM process drawing on an analysis of ICM case studies, and**

(iii) **to identify factors and approaches that have either facilitated or impeded the** incorporation **of science into ICM.**

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Reports and Studies GESAMP

The following reports and studies have been published so far. They are available from any of the organizations sponsoring GESAMP.

1. Report of the seventh session, London, 24-30 April 1975. (1 975). Rep. Stud. GESAMP, (1):pag.var. Available also in French, Spanish and Russian

2. Review of harmful substances. (1 976). Rep. Stud. GESAMP, (2):80 p.

3. Scientific criteria for the selection of sites for dumping of wastes into the sea. (1975). Rep. Stud. GESAMP, (3):21 p. Available also in French, Spanish and Russian

4. Report of the eighth session, Rome, 21-27 April 1976. (1976). Rep. Stud. GESAMP, (4):pag. var. Available also in French and Russian

5. Principles for developing coastal water quality criteria. (1976). Rep.. Stud. GESAMP, (5):23 p.

6. Impact of oil on the marine environment. (1977). Rep. Stud. GESAMP, (6):250 p.

7. Scientific aspects of pollution arising from the exploration and exploitation of the sea-bed. (1 977). Rep). Stud. GESAMP, (7):37 p.

8. Report of the ninth session, New York, 7-11 March 1977. (1977). Rep. Stud.G ESAMP, (8):33 p. Available also in French and Russian

9. Report of the tenth session, Paris, 29 May -2 June 1978. (1978). Rep. Stud.G ESAMP, (9):pag.var. Available also in French, Spanish and Russian

10. Report of the eleventh session, Dubrovnik, 25-29 February 1980. (1980). Ret). Stud. G ESAMP, (10):pag.var. Available also in French and Spanish

11. Marine Pollution implications of coastal area development. (1980). rep. Stud .GE SAMP, (11):114 p.

12. Monitoring biological variables related to marine pollution. (1980). Rep. Stud.G ESAMP, (12):22 p. Available also in Russian

13. Interchange of pollutants between the atmosphere and the oceans. (1980). Rep. stud.GESAMP, (13):55 p.

14. Report of the twelfth session, Geneva, 22-29 October 1981. (1981). Reg. Stud. GESAMP. (14): pag. var. Available also in French, Spanish and Russian

15. The review of the health of the oceans. (1 982). Rep. Stud. GESAMP, (15):108 p.

16. Scientific criteria for the selection of waste disposal sites at sea. (1982). Rep. Stud. GESAMP, (16):60 p.

17. The evaluation of the hazards of harmful substances carried by ships. (1982). Rep). Stud. GESAMP, (17):pag.var.

18. Report of the thirteenth session, Geneva, 28 February -4 March 1983. (1983). Ret), Stud. GESAMP (18):50 p. Available also in French, Spanish and Russian

19. An oceanographic model for the dispersion of wastes disposed of in the deep sea. (1983). Rep. Stud. GESAMP, (19):182 p.

20. Marine pollution implications of ocean energy development. (1984). Rep. Stud.G ESAMP, (20):44 p.

21. Report of the fourteenth session, Vienna, 26-30 March 1984. (1984). Ret). Stud, GESAMP,. (21):42 p. Available also in French, Spanish and Russian

22. Review of potentially harmful substances. Cadmium, lead and tin. (1985). Rep. Stud. GESAMP, (22):1 14 p.

23. Interchange of pollutants between the atmosphere and the oceans (part II). (1985). Rep. Stud. GES AMP, (23):55 p.

24. Thermal discharges in the marine environment. (1984). Rep, Stud. GESAMP, (24):44 p.

25. Report of the fifteenth session, New York, 25-29 March 1985. (1985). Rep.Stud.GES AMP, (25):49 p. Available also in French, Spanish and Russian

26. Atmospheric transport of contaminants into the Mediterranean region. (1985). Rep.Stud. GES AMP, (26):53 p.

27. Report of the sixteenth session, London, 1- 21 March 1986. (1986). Rep. Stud.G ESAMP, (27):74 p. Available also in French, Spanish and Russian

28. Review of potentially harmful substances. Arsenic, mercury and selenium. (1986). Rep.Stud. GE SAMP, (28):172 p.

29. Review of potentially harmful substances. Organosilicon compounds (silanes and siloxanes). (1986). Published as UNEP Rep.Seas Rep. Stud., (78):24 p.

30. Environmental capacity. An approach to marine pollution prevention. (1986). Rep.Stud.GESAMP, (30):49 p.

31. Report of the seventeenth session, Rome, 30 March - 3 April 1987. (1 987). Rep.Stud.GESAMP, (31):36 p. Available also in French, Spanish and Russian

32. Land-sea boundary flux of contaminants: contributions from rivers. (1987). Rep.Stud.GESAMP, (32):172 p.

33. Report on the eighteenth session, Paris, 11-15 April 1988. (1988). Rep. Stud.GESAMP, (33):56 p. Available also in French, Spanish and Russian

34. Review of potentially harmful substances. Nutrients. (1990). Rep. Stud. GESAMP, (34):40 p.

35. The evaluation of the hazards of harmful substances carried by ships: Revision of GESAMP Reports and Studies No. 17. (1989). Rep. Stud. GESAMP, (35): pag.var.

36. Pollutant modification of atmospheric and oceanic processes and climate: some aspects of the problem. (1989). Rep.Stud.GESAMP, (36):35 p.

37. Report of the nineteenth session, Athens, 8-12 May 1989. (1 989). Rep. Stud.GESAMP, (37):47 p. Available also in French, Spanish and Russian

38. Atmospheric input of trace species to the world ocean. (1989). Rep. Stud. GESAMP, (38):111 p.

39. The state of the marine environment. (1990). Rep.Stud. GESAMP, (39):111 p. Available also in Spanish as Inf.Estud.Progr.Mar.Reg.PNUMA (115):87 p.

40. Long-term consequences of low-level marine contamination: An analytical approach. (1989). Rep. Stud. GESAMP, (40):14 p.

41. Report of the twentieth session, Geneva, 7-11 May 1990. (1990). Rep. Stud.GESAMP (41):32 p. Available also in French, Spanish and Russian

42. Review of potentially harmful substances. Choosing priority organochlorines for marine hazard assessment. (1990). Rep. Stud. GESAMP (42):10 p.

43. Coastal modelling. (1991). Rep.Stud.GESAMP, (43):187 p.

44. Report of the twenty-first session, London, 18-22 February 1991. (1991). Rep. Stud,GESAMP," (44):53 p. Available also in French, Spanish and Russian

45. Scientific strategies for marine environmental protection. (199 1). Rep. Stud.G ESAMP, (45):34 p.

46. Review of potentially harmful substances. Carcinogens: their significance as marine pollutants. (1991). Rep. Stud. GESAMP, (46):56 p.

47. Reducing environmental impacts of coastal aquiculture. (1991). Rep. Stud.G ESAMP, (47):35 p.

48. Global changes and the air-sea exchange of chemicals. (1991). Rep. Stud.GES AMP (48):69 p.

49. Report of the twenty-second session, Vienna, 9-13 February 1992. (1992). Rep. Stud.GES AMP, (49):56 p. Available also in French, Spanish and Russian

50. Impact of oil, individual hydrocarbons and related chemicals on the marine environment, including used lubricant oils, oil spill control agents and chemicals used offshore. (1993). Rep. Stud. GESAMP, (50):1 78 p.

51. Report of the twenty-third session, London, 19-23 April 1993. (1993). Rep.Stud.GES AMP, (51):41 p. Available also in French, Spanish and Russian

52. Anthropogenic influences on sediment discharge to the coastal zone and environmental consequences. (1994). Rep. Stud. GE SAMP, (52):67 p.

53. Report of the twenty-fourth session, New York, 21-25 March 1994. (1994). Rep.Stud.G ESAMP, (53):56 p. Available also in French, Spanish and Russian

54. Guidelines for marine environmental assessment. (1994). Rep. Stud. GESAMP, (54):28 p.

55. Indicators of marine ecosystem health. (in press). Rep.Stud.GES AMP, (55)

56. Report of the twenty-fifth session, Rome, 24-28 April 1995. (1995). Rep. Stud.GESA MP, (56):54 p. Available also in French, Spanish and Russian

57. Monitoring of ecological effects of coastal aquiculture wastes. (in press). Rep.Stud.GES AMP, (57)

58. The invasion of the ctenophore Mnemiopsis leidyi in the Black Sea. (in press). Rep.Stud.GES AMP, (58)

59. The sea-surface microlayer and its role in global change. (in press). Rep.Stud.GE SAMP, (59)

60, Report of the twenty-sixth session, Paris, 25-29 March 1996, (1996) Rep. Stud. GESAMP; (60):29p, Available also in French, Spanish and Russian