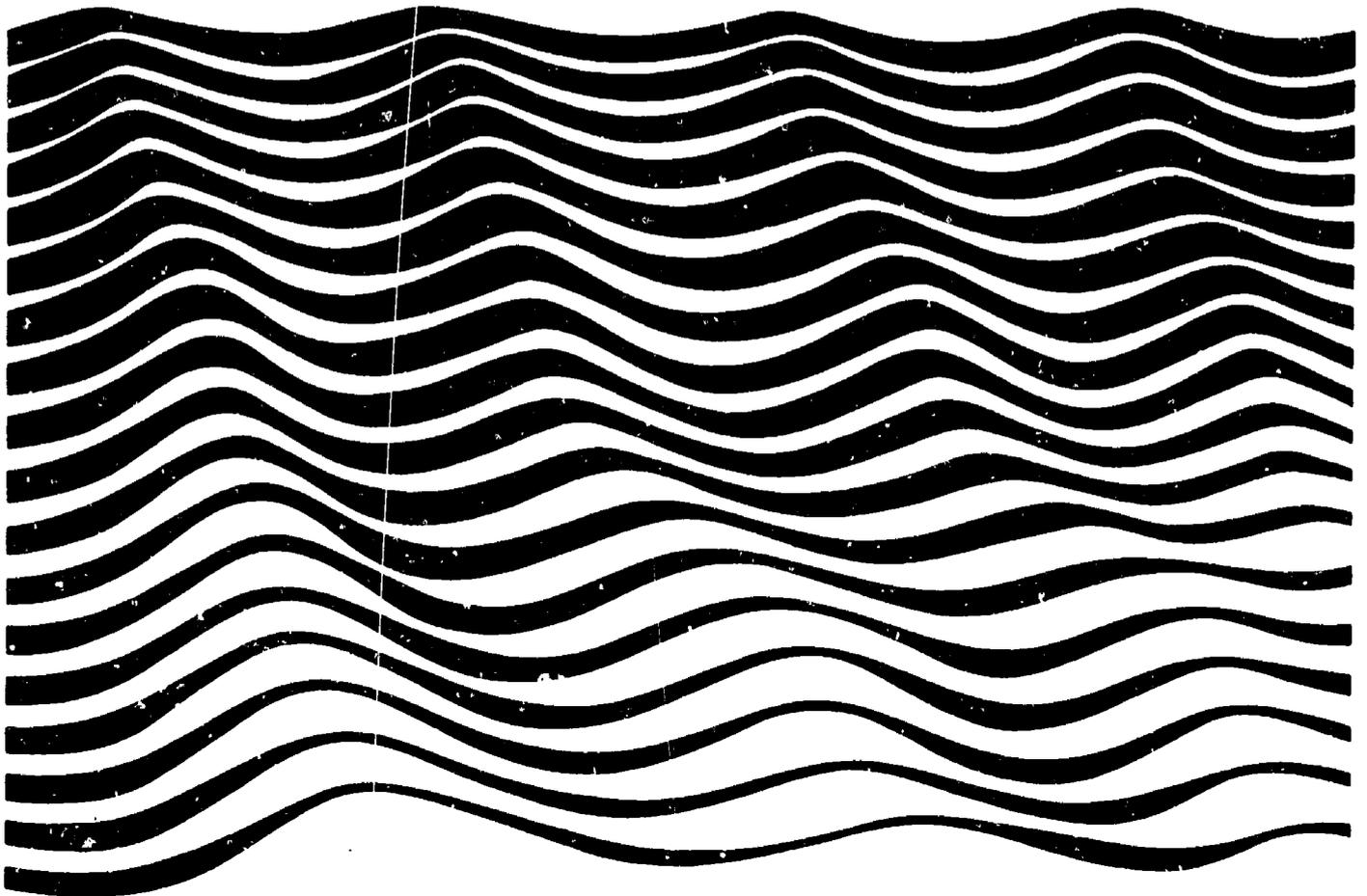


Unesco technical papers  
in marine science 47

## Research on coastal marine systems

Report of the third meeting  
of the Unesco/SCOR/IABO  
consultative panel on  
coastal systems  
October, 1984



Unesco 1986

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19	1974	—	36	1981	WG 10
<p>Marine Science Teaching at the University Level. Report of the Unesco Workshop on University Curricula-Available in Spanish and Arabic</p>			<p>The practical salinity scale 1978 and the international equation of state of seawater 1980. Tenth report of the Joint Panel on Oceanographic Tables and Standards, (JPOTS). Sidney, B.C., Canada, 1-5 September 1980. Sponsored by Unesco, ICES, SCOR, IAPSO. Available in Ar, Ch, F, R, S</p>		
24	1976	WG 10	<p>(Примечание: Этот доклад (текст идентичен) был первоначально издан только на английском языке под заголовком <i>Tenth report of the Joint Panel on Oceanographic Tables and Standards</i> (Десятый доклад Объединенной группы по океанографическим таблицам и стандартам)). Имеется на арабском, испанском, китайском, русском и французском языках.</p>		
<p>Seventh report of the joint panel on oceanographic tables and standards, Grenoble, 2-5 September 1975; sponsored by Unesco, ICES, SCOR, IAPSO</p>			37	1981	WG 10
<p>Marine science programme for the Red Sea: Recommendations of the workshop held in Bremerhaven, FRG, 22-23 October 1974; sponsored by the Deutsche Forschungsgemeinschaft and Unesco</p>			<p>Background papers and supporting data on the Practical Salinity Scale 1978.</p>		
26	1976	—	38	1981	WH 10
<p>Marine science in the Gulf area-Report of a consultative meeting, Paris, 11-14 November 1975</p>			<p>Background papers and supporting data on the International Equation of State of Seawater 1980.</p>		
27	1976	WG 10	39	1981	WG 10
<p>Collected reports of the joint panel on oceanographic tables and standards, 1964-1969</p>			<p>International Oceanographic Tables, Vol. 3</p>		
28	1978	WG 10	40	1982	WG 10
<p>Eighth report of the joint panel on oceanographic tables and standards, Woods Hole, U.S.A., sponsored by Unesco, ICES, SCOR, IAPSO</p>			<p>International Oceanographic Tables, Vol. 4. (To be published)</p>		
29	1979	—	41	1982	WG 44
<p>Committee for the preparation of CLOFETA-Report of the first meeting, Paris, 16-18 January 1978</p>			<p>Ocean-Atmosphere Materials exchange (OAMEX) Report of SCOR Working Group 44, Unesco, Paris, 14-16 November 1979</p>		
30	1979	—	42	1983	—
<p>Ninth report of the joint panel on oceanographic tables and standards, Unesco, Paris, 11-13 September 1978</p>			<p>Carbon dioxide sub-group of the joint panel on oceanographic tables and standards. Report of a meeting Miami, Florida, 21-23 September 1981 sponsored by Unesco, ICES, SCOR, IAPSO</p>		
31	1980	—	43	1982	—
<p>Coastal lagoon survey (1976-1978)</p>			<p>International Symposium on Coastal lagoons Bordeaux, France, 8-14 September 1981 Available in F and S</p>		
32	1981	—	44	1983	—
<p>Coastal lagoon research, present and future, Report and guidelines of a seminar, Duke University Marine Laboratory, Beaufort, NC, U.S.A. August 1978. (Unesco, IABO).</p>			<p>Algorithms for computation of fundamental properties of seawater. Endorsed by Unesco/SCOR/ICES/IAPSO Joint Panel on Oceanographic Tables and Standards and SCOR Working Group 51.</p>		
33	1981	—	45	1985	—
<p>Coastal lagoon research, present and future. Proceedings of a seminar, Duke University, August 1978, (Unesco, IABO).</p>			<p>The International System of Units (SI) in Oceanography Report of IAPSO Working Group on Symbols, Units and Nomenclature in Physical Oceanography. (SUN)</p>		
34	1980	WG 62	46	1986	—
<p>The carbon budget of the oceans. Report of a meeting, Paris, 12-13 November 1979</p>			<p>Opportunities and problems in satellite measurements of the sea Report of SCOR Working Group 70</p>		
35	1980	—			
<p>Determination of chlorophyll in seawater. Report of intercalibration tests sponsored by SCOR and carried out by C.J. Lorenzen and S.W. Jeffrey, CSIRO Cronulla, N.S.W., Australia, September-October 1978</p>					

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## PREFACE

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## ABSTRACT

The Consultative Panel on Coastal Systems is co-sponsored by Unesco, the Scientific Committee for Oceanic Research (SCOR) and the International Association for Biological Oceanography (IABO). The Panel's terms of reference are as follows:

1. To review the present status and to advise on the conceptual planning in order to meet the objectives of the Unesco Major Interregional Project on research and training leading to the integrated management of coastal systems (COMAR).
2. To review and advise on the scientific quality of the programme and recommend, if appropriate, actions to improve knowledge on the coastal systems.
3. To review and recommend strategies to transfer the scientific knowledge in view of an integrated management of the coastal systems.
4. To review and advise on the implementation of the various regional components of the Major Interregional Project (COMAR).

The present report contains a detailed analysis by the Consultative Panel of the various components of the COMAR Project. The components can be broken down into: (1) the scientific activities, undertaken in co-operation with SCOR and IABO, concerning traditional knowledge and management of coastal systems, and (2) programmes developed in the regions of Latin America and the Caribbean, Asia and the Pacific, the Mediterranean and Red Seas, and Europe.

## Résumé

Le Comité consultatif pour les systèmes côtiers, patronné par l'Unesco, par le Comité scientifique de la recherche océanique (SCOR) et par l'Association internationale d'océanographie biologique (AIOB), a reçu pour mandat :

1. d'examiner l'état des activités et de donner des avis sur les plans conçus en vue d'atteindre les objectifs du Projet majeur interrégional de l'Unesco pour la recherche et la formation en vue de l'aménagement intégré des systèmes côtiers (COMAR),
2. d'examiner et de donner des avis sur la qualité scientifique des programmes et de recommander, s'il y a lieu, des actions en vue d'améliorer la connaissance des systèmes côtiers,
3. d'examiner et de recommander des stratégies de transfert de la connaissance scientifique en vue d'une gestion intégrée des systèmes côtiers,
4. d'examiner et de donner des avis sur l'exécution des diverses composantes régionales du COMAR.

Le présent rapport constitue une analyse détaillée des diverses composantes du projet COMAR, faite par le Comité consultatif relatives, d'une part aux activités de caractère scientifique (concernant la connaissance traditionnelle et la gestion des systèmes côtiers), entreprises en coopération avec le SCOR et l'AIOB, et d'autre part aux programmes mis en oeuvre dans les différentes régions : Amérique latine et Caraïbes, Asie et Pacifique, Afrique, Méditerranée et mer Rouge, et enfin Europe.

## RESUMEN ANALITICO

El Grupo Consultivo de Expertos en Sistemas Costeros, copatrocinado por la Unesco, el Comité Científico de Investigaciones Oceánicas (SCOR) y la Asociación Internacional de Oceanografía Biológica (IABO), tiene el siguiente mandato:

1. Examinar la situación actual y asesorar sobre la planificación conceptual con miras a satisfacer los objetivos del Programa Interregional Principal de la Unesco de Investigación y Formación para una Gestión Integrada de los Sistemas Costeros (COMAR).
2. Estudiar la calidad científica del programa, prestar asesoramiento sobre el mismo y recomendar las medidas que estime apropiadas para mejorar el conocimiento de los sistemas costeros.
3. Estudiar y recomendar estrategias para la transferencia de conocimientos científicos relativos a la gestión integrada de los sistemas costeros.
4. Examinar y prestar asesoramiento sobre la ejecución de los diversos componentes regionales del Programa Interregional Principal (COMAR).

El presente informe contiene un análisis detallado de los diversos componentes científicos del Programa COMAR, efectuado por el Grupo Consultivo de Expertos. Entre dichos componentes cabe distinguir: 1) las actividades científicas iniciadas en cooperación con el SCOR y la IABO sobre los conocimientos y la gestión tradicionales de los sistemas costeros, y 2) los programas desarrollados de las regiones de América Latina y el Caribe, Asia y el Pacífico, el Mediterráneo y el Mar Rojo y Europa.

## РЕЗЮМЕ

Консультативная группа по прибрежным системам совместно финансируется ЮНЕСКО, Научным комитетом по океанографическим исследованиям /СКОР/ и Международной ассоциацией биологической океанографии /МАБО/. Полномочия Группы являются следующими:

1. Обзор существующего положения дел и консультация по вопросам концептуального планирования для решения задач Основного межрегионального проекта ЮНЕСКО по исследованиям и подготовке кадров с целью комплексного освоения прибрежных систем /КОМАР/.
2. Проведение обзоров и консультация по вопросам научного качества программы и рекомендация, в случае необходимости, мероприятий с целью углубления знаний о прибрежных системах.
3. Рассмотрение и рекомендация стратегий передачи научных знаний с целью комплексного управления прибрежными системами.
4. Проведение обзоров и консультация по вопросам выполнения различных региональных компонентов Основного межрегионального проекта /КОМАР/.

В настоящем докладе содержится подробный анализ различных компонентов проекта КОМАР, проведенный Консультативной группой. Данные компоненты можно подразделить следующим образом: /1/ проводимые в сотрудничестве со СКОР и МАБО научные мероприятия, касающиеся традиционных знаний о прибрежных системах и управления ими, и /2/ программы, разработанные в регионах Латинской Америки и Карибского бассейна, Азии и Тихого океана, Средиземного и Красного морей, а также Европы.

## خلاصة

تعمل اللجنة الاستشارية بشأن النظم الساحلية تحت رعاية مشتركة من اليونسكو واللجنة العلمية لبحوث المحيطات ( سكور ) والرابطة الدولية للأوقيانوغرافيسا البيولوجية ( أياجو ) . وفيما يلي صلاحيات هذه اللجنة :

١ - استعراض الأوضاع الحالية وتقديم المشورة بشأن التخطيط النظرى من أجل تحقيق أهداف مشروع اليونسكو الرئيسى المشترك بين المناطق للبحوث والتدريب من أجل التخطيط العمرانى المتكامل للنظم الساحلية ( كومار ) .

٢ - النظر فى المستوى العلمى للبرنامج واسداء المشورة بشأنه والتوصية عند اللزوم بتدابير تستهدف تحسين المعارف عن النظم الساحلية .

٣ - استعراض استراتيجيات والتوصية باتباعها من أجل نقل المعارف العلمية توخيسا لادارة متكاملة للنظم الساحلية .

٤ - استعراض عمليات تنفيذ شتى العناصر الاقليمية للمشروع الرئيسى المشترك بين المناطق ( كومار ) وتقديم المشورة بشأنها .

ويحتوى هذا التقرير على تحليل مفصل أجرته اللجنة الاستشارية لمختلف عناصر مشروع كومار . ويمكن تقسيم هذه العناصر الى ما يلى : (١) الأنشطة العلمية التى يظطلع بها بالتعاون مع سكور وأياجو بخصوص المعارف التقليدية وادارة النظم الساحلية ، و (٢) البرامج التى تعد فى مناطق أمريكا اللاتينية والكاريبى ، وآسيا والمحيط الهادى ، والبحر المتوسط والبحر الأحمر ، وأوروبا .

## 摘 要

沿海系统协商小组是由教科文组织、海洋研究科学委员会(SCOR)及国际生物海洋学协会(IABO)联合组办的。该小组职权范围如下:

1. 审查现状并就概念规划提出建议,以便符合教科文组织沿海系统综合治理研究与培训地区间重大项目(COMAR)的各项目标。

2. 对计划的科学质量进行审查和提出建议,并在适当的情况下建议采取行动以提高对沿海系统的认识。

3. 对转让有关综合治理沿海系统方面的科学知识的战略进行审议并提出建议。

4. 就实施地区间重大项目(COMAR)的各地区部分进行审议,并提出建议。

本报告载有协商小组对地区间重大项目各组成部分所作的详尽分析。这些部分可分为:(1) 与海洋研究科学委员会及国际生物海洋学协会合作进行的有关沿海系统的传统知识及治理方面的科学活动,(2) 在拉丁美洲及加勒比地区、亚洲和太平洋地区、地中海和红海地区以及欧洲地区开展的各项计划。

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## **I. INTRODUCTION**

The Consultative Panel on coastal systems held its third meeting October 17-18, 1984 at Roscoff, France. Ten scientists, including specialists in the various coastal systems, attended the meeting. Several scientists attended in a personal capacity as well as members of the UNESCO Division of Marine Sciences and the IOC (List of Participants is in Annex I).

The tasks of the Consultative Panel set forth by the Chairman (H. Postma) were :

1. - To evaluate the present programs of the UNESCO Coastal Marine Project (COMAR).
2. - To recommend future programs with an emphasis on new initiatives in scientific research and integrated management of coastal systems.
3. - To present these findings to UNESCO and to the SCOR Executive Committee.

### **1.1. The Coastal Marine Project of UNESCO**

The Coastal Marine Project (COMAR) of UNESCO consists of two major divisions. The Core Project of COMAR is aimed at promoting research and training on the main aspects of coastal systems with an emphasis on :

1. Their ecological structure and function.
2. Their interaction and exchange of energy and materials with other systems.
3. The relationship of coastal systems with the land and the open ocean.

The **Core Project** of COMAR in cooperation with IABO seeks also to collect and evaluate traditional knowledge and practices in coastal systems and to incorporate this new knowledge into research and management.

The second division of COMAR consists of the **Regional Programs** in Asia and the Pacific, Latin America and the Caribbean, Africa, the Mediterranean, Red Sea and Gulf, and in Europe. The **Regional Programs** are concerned with particular regional problems in research and management while maintaining a close relationship to the **Core Project**.

## **2. THE CORE PROJECT OF COMAR**

### **2.1. Coastal research in relation to SCOR**

In comparison to UNESCO and its IOC, SCOR has been less active in promoting coastal research. More effort is needed to convince SCOR of the importance of coastal systems and processes.

The Consultative Panel recommends the establishment of a Standing Panel on Coastal Oceanography in SCOR for the following reasons :

(1) A more continuous input of ideas on coastal research is necessary. This is not answered by the present working group system. In fact, after this general meeting all working groups on coastal oceanography will be finished.

(2) Proposals for new working groups need careful screening to avoid introduction of topics which are of only local importance.

(3) There is a rising demand from UNESCO for guidance in the evaluation of new proposals. The existing Consultative Panel on coastal systems, in its present composition, might also accomplish this task, but is better equipped for the review of regional programs of UNESCO, such as COMAR. If the Consultative Panel is established, the position of Reporter on Coastal Affairs becomes superfluous.

### **2.1.1. Coastal-Offshore Systems Relationships (SCOR/IABO/UNESCO Working group 65).**

The report of the second meeting of Working Group 65 was presented and its conclusions were considered to be sound. The Consultative Panel expressed concern that these conclusions applied only to high latitudes. The report emphasizes land-sea interactions rather than coastal-offshore relationships. There seem to be basic questions on the importance of riverine discharges in nearshore areas. Natural catastrophes such as major storms are not considered in the report.

The final report presents statements on nutrient exchange and transport of organic matter between coastal and offshore systems which raise interesting new ideas. From work done recently, it appears that coastal areas do not contribute to nutrient supply and organic matter of offshore areas as it was expected before. Coastal system "outwelling" may not be always as productive on all trophic levels as is generally postulated, in comparison to offshore systems. These lucid observations are interesting topics for the Seminar proposed by the Working Group to be held in San Francisco. The report states rightly that little is known about the interactions between the nearshore and offshore areas

The Consultative Panel recommends :

1. That Working Group 65 narrows the scope of the proposed symposium by selecting for the program only key issues that it has identified.
2. That Working Group 65 submit this new program to the proposed Standing Panel on Coastal Oceanography for approval.

The Consultative Panel is concerned about the need for a similar effort in low latitude tropical environments. The proposed Standing Panel on Coastal Oceanography should address as soon as possible the various issues of coastal-offshore ecosystem relationships for low latitude environments.

### **2.1.2. Research and management of mangrove ecosystems**

UNESCO's Division of Marine Sciences was the first international organization to recognize the national and economic importance of mangrove ecosystems (in 1972) and also the first to initiate a major international program of research and training on coastal habitats and resources (COMAR 1980). Its regional program in Asia and the Pacific has created a cadre of scientists and managers within the region and laid a firm basis for the sustained utilization of natural resources that is consistent with their conservation. As a result of the success of COMAR and its international reputation, other international organizations are now in a position to contribute to the objectives of coastal resources management and conservation. In view of the importance of this international effort, the Consultative Panel makes two major recommendations :

1. UNESCO provide briefings and background materials on COMAR to other assistance organizations to ensure that their developing programs are complementary and supporting with minimum overlap and duplication.

2. UNESCO should encourage other assistance organizations to develop and expand key elements of the COMAR program to ensure their permanence and continuity.

Mangrove management, as it becomes more sophisticated, is beginning to outpace the supporting research base. In future program activities, additional emphasis should be placed on basic mangrove research, research on development mitigation and development alternatives and scientific syntheses.

The Consultative Panel notes with discouragement that the degradation and/or loss of mangrove ecosystems continues at a relatively rapid pace throughout the world and agrees that COMAR activities, aimed at counter-balancing this, should be expanded and continued.

### **2.1.3. The Fifth International Coral Reef Congress (IABO/UNESCO)**

The **Fifth International Coral Reef Congress (Tahiti, 1985)** was granted official UNESCO patronage. In addition, under the COMAR program, UNESCO is providing financial support for participants from developing countries to present papers at the Congress. There are also plans (i) to report and discuss in the relevant Congress session the results of a "field workshop with advanced training on assessment of human induced damage to coral reefs" scheduled in Indonesia just prior to the Congress, and (ii) to convene an informal meeting to discuss coral taxonomy and future training as follow-up on the recommendations of the Regional Coral Taxonomy Workshop held at Phuket (Thailand) in February 1984.

### **2.1.4. Seagrasses : volume on research methods**

A UNESCO/IABO volume entitled **Seagrass Research Methods** is in preparation (R. Phillips and C. Mc Roy, eds). This volume, scheduled for publication in early 1985 will complement **Coral Reefs : Research Methods** (Stoddart and Johannes, eds.) and **The Mangrove Ecosystem : Research Methods** (Snedaker and Snedaker, eds.), already published.

## **2.2. New Research Perspectives**

### **2.2.1. IABO/SCOR/UNESCO ad hoc meeting on high diversity marine ecosystems**

There exists for low diversity ecosystems a body of knowledge about the general functioning of these systems, against which it is possible to start planning an experimental approach to the solution of a key problem, namely the "recruitment problem". These activities will concern primarily the International Recruitment Programme (IREP) developed recently by IOC.

Conversely, as it is recognized in the Report of the IABO/UNESCO ad hoc meeting which met in September 1984, that we do not have the same body of knowledge concerning high diversity ecosystems where it is felt that inter-specific relations and their interactions with chemical processes may be of great importance. The envisaged Working Group is to address this question and to emphasize an experimental approach in order to provide basic understanding of the functioning of the high diversity marine ecosystems. IABO recommends to SCOR the formation of a joint working group entitled "High diversity marine ecosystems and their living resources" with the following terms of reference :

1. - To develop improved concepts and models of high diversity marine ecosystems in the medium and low latitudes.

2. - To suggest specific field observations in contrasting environments and controlled ecosystem experiments which would contribute to a better understanding of these ecosystems and of their proper management. Consideration should be given to both pilot projects and full scale programs.

3. - To identify specific research problems requiring satellite data and service components of climate-related ocean science studies ; to identify key oceanographic processes that influence distribution and abundance in highly diversified biota.

4. - To propose ways and means of establishing relevant cooperative research activities between interested institutions.

#### **2.2.2. Molecular genetics of micro-organisms applied to nutrient cycles in coastal systems.**

The Consultative Panel considered a proposal for a program (and/or a working group) to investigate the role of molecular genetics in nutrient cycling in coastal areas. It was noted that new techniques for developing gene probes for cloning genes and for plasmid analysis are available. However, the panel was not convinced that the case had been made that these techniques would be useful in developing a better understanding and eventual control of nutrient cycling in coastal areas. The objectives of management, for example in a mangrove swampy

brackish area, are to maximize the flux of material and energy through the invertebrate food web leading to species of commercial interest. A major factor influencing that process is the hydrology of the area. It is considered that marine macrophytes in general are adapted on an evolutionary time scale to the existing regimes of nutrient regeneration. It seems probable that any change in the properties of the microorganisms would be deleterious to the performance of the higher plants and invertebrates.

It therefore seemed to be premature to launch a programme or working group on the molecular genetics of micro-organisms within the context of COMAR. The Panel recommended that a related proposal be brought before an ICSU organization more closely concerned with molecular genetics.

### **2.2.3. New research concepts and model applied to coastal systems. Experimental studies of micro and meso scale phenomena.**

Ways of conceptualizing the relationships between physical, chemical and biological processes have been considered in recent years for both pelagic and benthic systems.

The physics concerns the relationships between the standard deviation of space scales of dispersion and time. The biological representation reflects the relationships between generation times, spatial structure of patches and mobility of living organisms, their level of organization in the foodwebs and its interaction with biogeochemical cycling. Few physical and chemical processes contributing to biological processes have been properly addressed.

The Panel felt it was important to introduce new concepts and methodologies in coastal oceanography and to have appropriate mechanisms for doing it.

The recent book which resulted from the activities of SCOR WG 59 is recommended for COMAR as a source of references for new research concepts and models ("**Flows of Energy and Materials in Marine Ecosystems**" Fasham (ed) ; Plenum Press, 1984).

Present activities developed by SCOR/IABO WG 73 on "Ecological theory in relation to biological oceanography" are also relevant to this topic as well as the recently proposed Working Group on "high diversity marine ecosystems".

#### **2.2.4. Coastal processes and systems interactions : a comparative program between Caribbean and Pacific.**

Based on the results of the workshop on "Coral reefs, seagrass beds and mangroves : their interaction in the coastal zones of the Caribbean" (UNESCO Report in Marine Science 23) and a recent review on similar coastal systems interactions in the tropical Pacific (Birkeland et al. ; South Pacific Regional Environment Program), the Consultative Panel recommends to UNESCO that a workshop be convened in the Pacific in 1985 to consider similarities and differences in the structure and function of coastal systems in the two regions.

#### **2.3. The traditional knowledge and management of Coastal Systems.**

The Consultative Panel takes note of the work of IABO in this area and fully endorses the recommendation of IABO that a working group be established with the following responsibilities :

1. To propose an agenda of regional workshops to examine various aspects of traditional practices and knowledge particular to a region.
2. To develop and implement within the various regions, strategies for the compilation of existing data.
3. To propose a means of introducing pertinent information into the curricula of national educational systems.
4. To prepare publications on the subject.
5. To serve as a source of scientific advice to IABO and UNESCO.

The Consultative Panel strongly agrees with the recommendation of IABO that UNESCO support the activities of the working group. The Consultative Panel supports the suggestion of IABO that UNESCO consider the possibility of supporting annual international scholarships for the winners of national research report competitions on traditional knowledge and management of coastal systems.

### **3. THE COMAR REGIONAL PROGRAM**

The COMAR Regional program is aimed at reinforcing the efforts and capabilities of particular countries to build up a base of scientific knowledge to be applied to the rational management of coastal systems. While this effort is truly regional, COMAR promotes support for the research and management efforts of individual countries and seeks to integrate such efforts into regional cooperation.

The Consultative Panel recognizes the need for common approaches to common problems within and between the various regions. UNESCO should establish through COMAR a program to coordinate activities of national, regional and international agencies engaged in research and management of the coastal marine environment.

#### **3.1. Asia and the Pacific**

The Consultative Panel considered the regional activities of COMAR in the Asia and Pacific Region. At present, COMAR programs in Asia focus on mangroves and coral reef ecosystems ; after years of preparation, the countries in Asia have agreed to cooperate in activities related to survey, training and research on these types of ecosystems.

Under the UNDP/UNESCO Regional Project on Mangrove Ecosystems (RAS/79/002) 12 countries in the region are actively cooperating by holding training courses and workshops and by preparing the final document of the project to be entitled "**Mangroves of Asia and the Pacific - Status and Usage**". The training activities and workshops, as well as the final document are meant to be conducive to the establishment of guidelines for the appropriate management of mangrove ecosystems (better described as "**Tropical Intertidal Wetlands**"). The following points were discussed as important aspects to be dealt with :

1. Cooperation among agencies ;
2. Publications and exchange of information ;
3. Incentives for research and identification of gaps in knowledge ;

4. Degradation and loss of mangrove areas ;
5. Traditional usage and application of modern science in the management of mangroves on a high yield long term sustained multiple use basis.

The Panel took notice of the achievements of the project so far, of the establishment of REMIN (Regional Mangroves Information Network) and the publication of the Newsletter "BAKAWAN" by the Philippines as the first step towards the consolidation of a mangrove network.

The second area of activity of COMAR in the Asia and Pacific Region refers to strengthening the scientific basis of coral reef management in the region. The knowledge of coral islands and coral reefs that has resulted in advice leading to rational management practices was briefly reviewed as well as coral reef science and management programs. Training and information were identified as major areas in need of continued special attention, as well as the need to develop standard research methods. A regional program for development was sketched out and the main points are reflected in the recommendations that follow.

The Panel strongly supports the implementation of such long-term programs of activities that involve training and the acquisition, processing and dissemination of information.

### **3.1.1. Recommendations**

While the physical and political geography of Asia and the Pacific is complex, the nations of the region share common problems and similar long term needs in the management of their coastal environment. The COMAR programs were considered successful in addressing those problems and needs particularly through the Regional Mangrove Project and COMAR activities in research and training in support of management of coral reefs. The interactions between coral reefs mangroves, seagrasses and other soft substrate benthic communities are complex, and an integrated approach to research and management is needed, particularly in small island nations. National programs and subregional initiatives such as the South Pacific Regional Environment Programme (SPREP), IOC/WESTPAC and Australia ADAB programs are addressing various issues of research and management of the coastal environment.

**The Consultative Panel recommends :**

1. That the UNDP/UNESCO Regional Mangrove Program scheduled to terminate in 1986 be extended for three years and expanded to include other nations which wish to become involved.

2. That UNESCO expand coral reef and mangrove programmes leading to the establishment of a framework for a regional approach to research and management of the shallow tropical marine environment and its resources.

3. That through COMAR, UNESCO establish with the national, regional and international agencies a program to coordinate activities relating to research and management of the coastal marine environment of the Asia and Pacific regions to facilitate common approaches to common problems and needs.

4. That the urgency for the following activities to be included within the regional program be noted :

**A. Workshops on training needs**

- research methods
- environment planning and management techniques.

**B. Personnel exchange and fellowships to facilitate training and coordination of activities of research and management.**

**C. A regional research project on the structure and dynamics of soft substrate, subtidal benthic communities, to be developed in coordination with more geographically restricted initiatives such as the cooperative program of the 6 member nations of ASEAN and Australia on marine science.**

**D. Workshops and production of technical reports on :**

- monitoring techniques
- measurement of human use of the marine environment
- development of a self reliant network for communication, training and access to technological resources and assistance

- review of problems caused by unsound development planning and development of environmental standards.
- application of remote sensing products to research and management of the coastal marine environment.

### **3.2. Latin America and Caribbean**

The objectives, priorities and activities of the COMAR project in Latin America and the Caribbean intitled **"Regional Project for Research and Training on Coastal Ecosystems of Latin America and the Caribbean and their Relations with the Continental Shelf"** (COSALC) were reviewed and approved at a meeting in Caracas, Venezuela, in 1982. The region has a large latitudinal range and three components were recognized : Caribbean Islands, Continental Tropical Coasts, and Temperate and Subantarctic Regions. It was recommended that a single COSALC project be established with these 3 regional components. A number of COSALC activities have been initiated and the region is prepared to undertake a full implementation of the COSALC project and is expecting its funding.

The Panel noted with interest the success of both Brazil and Venezuela in integrating COMAR/COSALC into existing governmental structures. These efforts should be promoted by governments in the region following their example.

#### **3.2.1. Pilot project on coastal lagoons**

A cooperative program for the study of coastal lagoons was established between Brazil, Mexico and Venezuela during a meeting in Mexico City (June, 12-13, 1984) with the purpose to promote research and training in participating countries and through multilateral cooperation, to help the countries to improve the programs of their institutions and their institutional cooperation.

The pilot project is mainly based on existing institutional infrastructure and resources in an exchange of scientists between programs and other activities such as courses and seminars. The initial phase of the pilot project will include **Lagoa dos Patos (Brazil), Laguna de Terminos (Mexico) and Lagunas Tacarigua-Unare-Piritu (Venezuela).**

Some specific actions were prepared during this phase as follows :

- course on coastal geology (Porto Alegre, Brazil)
- workshop on physical processes (Ciudad del Carmen, Mexico)
- workshop on biological processes (Caracas, Venezuela)
- exchange of investigators and students between the participating countries
- publication of bibliographies of the pilot areas
- systematic information exchange.

The Panel strongly supports these subregional activities.

### **3.2.2. Pilot project on comparative investigation of factors influencing organic productivity in the Caribbean coastal zone.**

Caribbean coastal zones contain three of the most productive ecosystems known : coral reefs, seagrass beds and mangroves. There is evidence that all are limited by the essential inorganic nutrients, especially nitrogen. Several mechanisms involving physical oceanographic processes and coastal configuration (collectively called the "island mass effect") bring and retain nutrients in the coastal zone, enhancing organic productivity. Coasts where input of nutrients is minimal are characterized by close coupling of producers and consumers and rapid recycling of nutrients. At the other end of a gradient are coasts where nutrient input is greatly increased. Also important to overall coastal productivity are linkages between the major ecosystems such as dissolved organic material (DOM), particulate organic material (POM) and migrating organisms.

The Caribbean provides an opportunity to examine the effect of enhanced nutrient input on coastal zone productivity. There are numerous islands of widely varying size and configuration. Many of these are served by good scientific support facilities. A series of islands or a larger section of coastline could be tentatively placed on a nutrient enrichment gradient. Comparative studies done by the same research teams at the different sites could evaluate the importance of coastal configuration, island mass effect and linkages between ecosystems on overall coastal zone productivity. This information will provide new insights into the management and conservation of important coastal resources in the Caribbean.

A bilateral project has been established between Venezuela and Columbia to examine the oligotrophic insular coasts of Los Roques (Venezuela) and San Andres (Columbia). This effort should be supported by UNESCO as a component of the sub-regional project.

### **3.2.3. Recommendations.**

1. The Coastal Panel was impressed with the progress made in the COSALC activities in Latin America and the Caribbean. The Panel was also much in favour of the proposals for the extension phase of the project. UNESCO was strongly urged to seek the requisite extra-budgetary financial support (e.g. from UNDP) for the COSALC project as a whole.

2. In view of the IOC subcommission (IOCARIBE) activities in the fields of living and non-living resources and in marine pollution research and monitoring in the Caribbean and that several of these activities are being conducted in cooperation with the Regional Seas Program of UNEP it is strongly recommended that IOCARIBE continue to facilitate the work of COSALC in the Caribbean.

3. The existing remote sensing centers of the region should be utilized in order that coastal systems may be adequately surveyed prior to the establishment of pilot projects.

## **3.3. Africa**

### **3.3.1. West Africa**

In West Africa, in continuation of a regional seminar (Dakar, 1979), and two field workshops (Saloum estuary, Senegal, 1983 and Ebrie Lagoon, Ivory Coast, 1985), a regional project for the study of coastal systems of West Africa is proposed. The project will be composed of four major components :

1. Evaluation of the resources of coastal ecosystems
2. Improvement of knowledge through promotion of further research on coastal systems

3. Institution of rational management schemes in relation to development, particularly fish farming.
4. Conservation and preservation of coastal marine ecosystems
5. Training of scientific and specialized personnel capable of supervising the management of coastal systems.

In order to broaden the base of the project UNESCO should continue to promote the development of multidisciplinary teams in the countries of the region (e.g. Benin, Cameroun, etc ...).

The regional project should also take into account : the activities of project WACAF 3 on Coastal erosion in West and Central Africa, as well as the results of the seminar on traditional knowledge and management of coastal systems in Africa to be held in Benin in 1985 under UNESCO/IABO sponsorship.

The Panel recommended also that the proposals for cooperative studies within the COMAR framework be reported to future sessions of the IOC Programme Group for Central and Eastern Atlantic (IOCEA).

### **3.3.2. East Africa**

In East Africa new programs have been proposed to (1) study coastal equilibrium changes resulting from river basin management, particularly the construction of dams and (2) to compare the structure and function of lakes and coastal marine systems.

The Consultative Panel expressed concern of the increasing trend in several areas to control rivers in response to immediate socio-economic benefits without due consideration to long-term environmental alterations.

The Panel endorsed the proposal submitted to UNESCO by the government of Tanzania for a project on coastal equilibrium changes by river basin management on the Rufigi-delta (Tanzania). The Panel also endorsed the suggestion to link this project on a bilateral basis with another proposed project on the effects of river

damming on the Zambezi River delta (Mozambique), as part of COMAR. For a reliable assessment of the post-damming alterations of the Zambezi and Rufigi deltas and the coastal zone, a remote sensing survey in conjunction with a field survey is essential.

Finally, a workshop on the similarities and differences in structure and function of lakes and coastal systems is planned for 1985. This workshop will also serve to revitalize aquatic science training and research by initiating multi-institutional and integrated research activities.

In view of the great need for basic research and training in the region, the Consultative Panel recommends that UNESCO pay particular attention to the implementation of these proposals and continue to stimulate local and regional programs.

#### **3.4. The Mediterranean and Red Sea**

A meeting of experts was convened by UNESCO at Tunis in September 1978. (See UNESCO Marine Science, document 7 : **"Coastal Ecosystems of the South Mediterranean"**). The meeting agreed upon a number of recommendations addressed to UNESCO, three of which have been implemented :

1. The convening of a workshop on eutrophication and dystrophy in coastal lagoons as exemplified by the lagoon of Tunis. This workshop took place in Tunis in 1983.

2. The organization of training courses in methodology for junior research workers.

Two training courses on Carbon-14 productivity and phytoplankton biomass were held at the University of Alexandria in 1980 and 1983, sponsored by UNESCO and the Danish Agency "Danida" with cooperation from the International Carbon-14 Agency, Copenhagen. Participants were from North and South Mediterranean countries, as well as other Arab and African countries.

3. A bibliography on Coastal lagoons from the South Mediterranean. This voluminous compilation from Morocco, Algeria, Tunisia, Libya and Egypt is preceded by a comprehensive but concise account on each lagoon. It is now in press as a UNESCO document.

Other recommendations which remain to be implemented consist of activities aiming at the promotion of regional cooperation.

The Panel discussed this last aspect and recommended a mission to explore the feasibility of a bilateral project between Tunisia and Egypt, sponsored by UNESCO. Such a bilateral project would be open at a later stage to other countries from the region.

In the Red Sea, coastal zone national programmes are centered at Ghardaga, Port-Sudan, Jeddah, Akaba (Jordan) and at the new Marine Science Institute in Aden. Port-Sudan and Jeddah have recently convened workshops on Red Sea Ecosystems, the former published in English and the latter in Arabic.

A field-training course on coral reefs has been organized for Red Sea scientists at Ghardaga and another one on pollution in Jeddah. The activities of the Arab states in the Gulf are coordinated through the Kuwait Action Plan (ROPME) to which Qatar is contributing its newly acquired research vessel. Through this plan several regional symposia and workshops were held in 1983 and 1984.

### **3.5. Europe**

The Consultative Panel noted with interest the large international and multidisciplinary research effort of COMAR centered on the Lagoon of Venice. In addition to its importance as a site under the World Heritage Program of UNESCO, the lagoon is important in that it is a system whose structure and function has been greatly altered by man over many centuries.

**List of Participants**

- **H. Postma** (Netherlands) (Chairman)
- **E.S. Diop** (Senegal)
- **Y. Halim** (Egypt)
- **R. Kenchington** (Australia)
- **P. Lasserre** (France ; IABO, Président)
- **J. Ogden** (U.S.A.)
- **K.H. Mann** (Canada)
- **L. Martins** (Brasil)
- **F. Pannier** (Venezuela)
- **S. Snedaker** (U.S.A.).
- **G. Siedler** (SCOR ; Chairman)
- **E. Tidmarsh** (SCOR ; Executive secretary)
- **M. Steyaert** (UNESCO)
- **D. Troost** (UNESCO)
- **M. Vannucci** (UNESCO/UNDP)
- **R. Dawson** (IOC)
- **J.P. Hie Dare** (Observer ; Ivory Coast).

A G E N D A

16 October 1984

5:00 - 7:00

Registration

17 October 1984

8:30 - 9:00

Opening of the meeting - Election of Chairman  
and Rapporteur

9:00 - 9:30

- I. The Major interregional project on research and training leading to the integrated management of coastal systems (COMAR)

A summary report

Document: COASTAL III/W/5; COMAR brochure (M. Stevaert)

- I.1 The "Core" project of COMAR

9:30 - 12:30

- I.1.1 The scientific knowledge and management on coastal systems - Co-operation with SCOR and IABO

Document: COASTAL III/W/6.1 (H. Postma)

- I.1.1.1 Coastal - offshore relationships - SCOR/IABO/Unesco W.G. 65 - Report

Document: COASTAL III/W/6.2 (P. Lasserre)

- I.1.1.2 Coastal processes and systems interactions: a comparative programme between Caribbean and Pacific

Document : COASTAL III/W.6.3 (J. Ogden)

- I.1.1.3 Research and management of mangrove ecosystems  
Document: COASTAL III/W/6.4 (S. Snedaker)  
COASTAL III/I/6.1 / I/6.2
- I.1.1.4 IABO/Unesco Congrès on coral reef  
Tahiti 1985  
Document: COASTAL III/W/6.5 (P. Lasserre/D. Troost)  
COASTAL III/I/6.3 / 6.4
- I.1.1.5 Seagrass. A volume on research methods  
Document: COASTAL III/6.9
- I.1.1.5 IABO/SCOR/Unesco ad hoc meeting on high diversity  
marine ecosystems  
Document: COASTAL III/W/6.6 (P. Lasserre)
- 11:00 - 11:15 Coffee break
- 11:15 - 12:00 I.1.2 New research perspectives
- I.1.2.1 New research concepts and models applied to coastal  
systems. Experimental studies of micro and meso-  
scale phenomena  
Document: COASTAL III/W/6.7 (P. Lasserre)
- I.1.2.2 Molecular genetics of micro-organisms applied  
to nutrient cycles in coastal systems  
Document: COASTAL III/W/6.8 (R. Colwell/M. Steyaert)
- 12:30 - 14:00 Lunch
- 14:00 - 14:30 I.1.3 The traditional knowledge and management of coastal  
systems. Co-operation with IABO  
Documents: COASTAL III/W/7.1 (P. Lasserre)  
I/7.1
- I.1.3.1 Seminar on traditional knowledge and management  
of coastal marine systems in Africa, 1985  
Document: COASTAL III/W/7.2 (Tentative)  
(Pliya/Lasserre)
- II. The regional activities of COMAR
- 14:30 - 15:30 II.1 In Asia (document COASTAL III/I/8.1)
- II.1.1 Research and training on mangrove ecosystems  
of Asia and the Pacific: present and future.  
Elements for a new regional project on coastal  
systems  
Documents: COASTAL III/W/8.1 (M. Vannucci)  
I/8.2 - I/8.3

II.1.2 Recent and planned related coral reef  
COMAR activities

Documents: COASTAL III/W/8.2 (D. Troost)  
I/8.4 - I/8.5

II.1.3 Policy and programme for strengthening the scientific  
basis of coral reef management in Asia and the Pacific

Document: COASTAL III/W/8.3 (R. Kenchington)

(see also document I/8.6)

15:30 - 16:30

II.2 In Latin America and the Caribbean

Document: COASTAL/III/I/9.1

II.2.1 Coastal systems of Latin America and the Caribbean:  
objectives, priorities, activities and recommendations

Documents: COASTAL III/W/9.1 (F. Pannier)  
I/9.2 ; I/9.3

II.2.2 COSALC pilot project on coastal lagoons of Latin America

Document: COASTAL III/W/9.2 (L. Martins)

II.2.3 COSALC/N.S.F. pilot project on comparative investigation  
of factors influencing organic productivity in the  
Caribbean coastal zone

Document: COASTAL III/W/9.3 (J. Ogden)

16:30 - 16:45

Coffee break

16:45 - 18:30

II.2.4 COASTAL pilot project on coastal and beach erosion/  
accretion in Lesser Antilles

Document: COASTAL III/W/9.4 (R. Lankford/M. Steyaert)

II.2.5 Third course on coastal geology, 1985

Document: COASTAL III/W/9.5 (L. Martins)

II.2.6 The COMAR Brazilian programme

Document COASTAL III/W/9.6 (L. Martins)

II.2.7 The COMAR Venezuelan programme

Document: COASTAL/III/W.9.7 (F. Pannier)



List of Working Documents

COASTAL III/0	Provisional Agenda
COASTAL III/1	Annotated Provisional Agenda
COASTAL III/2	List of General and Working documents
COASTAL III/3	List of Information documents
COASTAL III/4	List of COMAR related publications

List of Working documentsGeneral (COASTAL III/1 - 5)

COASTAL III/W/5                      The COMAR project: a summary (M. Steyaert)

Scientific knowledge and management (COASTAL III/1 - 6)

COASTAL III/W/6.1	The coastal research. Cooperation with SCOR and IABO (H. Postma)
COASTAL III/W/6.2	Coastal offshore ecosystems relationships SCOR/IABO Unesco - Working Group 65, report (P. Lasserre)
COASTAL III/W/6.3	Coastal processes and systems interaction: a comparative programme between Caribbean and Pacific (J. Ogden)
COASTAL III/W/6.4	Research and management of mangrove ecosystems (S. Snedaker)
COASTAL III/W/6.5	IABO/Unesco International Congrès on Coral Reefs The programme (P. Lasserre, D. Troost)
COASTAL III/W/6.6	IABO/SCOR/Unesco ad hoc meeting on high diversity marine ecosystems (P. Lasserre) <ul style="list-style-type: none"> <li>. report of an ad hoc meeting (Sept. 1983, Roscoff)</li> <li>. proposal for a IABO/SCOR/Unesco Working Group</li> </ul>
COASTAL III/W/6.7	New research concepts and models applied to coastal systems. Experimental studies of micro and meso-scale phenomena (P. Lasserre)

- COASTAL III/W/6.8 Molecular genetics in connexion with nutrient cycles in coastal systems (R. Colwell/M. Steyaert)
- COASTAL III/W/6.9 Seagrass methods (M. Steyaert)

The traditional knowledge and management (COASTAL III/1 - 7)

- COASTAL III/W/7.1 Traditional knowledge and management of coastal marine systems. Report and recommendations of a IABO/Unesco ad hoc steering group (P. Lasserre)
- COASTAL III/W/7.2 Seminar on traditional knowledge and management of coastal marine systems in Africa
- Tentative programme (J. Pliya/P. Lasserre)

Regional activities in Asia and the Pacific

- COASTAL III/W/8.1 Research and training on mangrove ecosystems of Asia and the Pacific: present and future (M. Vannucci)
- COASTAL III/W/8.2 Recent and planned related Coral reef COMAR activities (D. Troost)
- COASTAL III/W/8.3 Policy and programme for strengthening the scientific basis of coral reef management in Asia and the Pacific (R. Kenchington)

Regional activities in Latin America and the Caribbean

- COASTAL III/W/9.1 Coastal systems in Latin America and the Caribbean, Objectives, priorities, activities and recommendations. Discussion of the project document - COSALC. Report of a regional meeting, 15-19 November 1982, Caracas, Venezuela - 1983 (F. Pannier)
- COASTAL III/W/9.2 COSALC pilot project on coastal lagoons in Latin America (L. Martins)
- COASTAL III/W/9.3 COSALC/N.S.F. Pilot project on comparative investigation of factors influencing organic productivity in the Caribbean coastal zone. A planning workshop (J. Ogden)

- COASTAL III/W/9.4 COSALC pilot project on coastal and beach erosion/ accretion in Lesser Antilles. Survey, lecture tour and training course (R. Lankford/M. Steyaert)
- COASTAL III/W/9.5 Third course on coastal geology, March 1985, Porto Alegre, Brazil. The programme (L. Martins)
- COASTAL III/W/9.6 The COMAR Brazilian programme (L. Martins)
- COASTAL III/W/9.7 The COMAR Verezuelan programme (F. Pannier)

#### Regional activities in Africa

- COASTAL III/W/10.1 Field workshop on research methodologies in estuaries and mangrove of West Africa. Estuary of Saloum, Sénégal. (E.S. Diop)
- COASTAL III/W/10.2 Field workshop on research methodologies in Coastal lagoons of West Africa. Lagoon of Ebrié, Ivory Coast (B. Mwaiseje/M. Steyaert)
- COASTAL III/W/10.3 Research programme on the delta of Rufigi, Tanzania Project document (B. Mwaiseje/M. Steyaert)
- COASTAL III/W/10.4 Proposal for a regional project on coastal systems of West Africa (E.S. Diop/B. Mwaiseje/M. Steyaert)
- COASTAL III/W/10.5 Control of coastal erosion in West and Central Africa (Unesco/UN-DIESA/UNEP projet WACAF/3, A. Suzyumov/M. Steyaert)
- COASTAL III/W/10.6 Unesco (COMAR)-IABO programme on comparing lakes and coastal marine system characteristics and functioning (B. Mwaiseje/M. Steyaert)

List of Information documents

Scientific knowledge and management (COASTAL III/-/6)

- COASTAL III/I/6.1      The mangrove ecosystems: research method , in press
- COASTAL III/I/6.2      Handbook for mangrove area management, 1984
- COASTAL III/I/6.3      Coral reef management handbook, 1984
- COASTAL III/I/6.4      Human activities causing damage to coral reefs: knowledge and recommendations - in preparation. Draft table of contents.

The traditional knowledge and management

- COASTAL III/I/7.1      Traditional knowledge and management of coastal marine systems in Asia and the Pacific, Jakarta December 1983. Proceedings of a regional seminar.

Regional activities in Asia and the Pacific

- COASTAL III/I/8.1      UNDP/Unesco (COMAR) regional research and training pilot programme on mangrove ecosystems in Asia and the Pacific (NAS/79/002): project document
- COASTAL III/I/8.2      ESCAP/Unesco/NECT Regional remote sensing training course on mangrove ecosystem. November 28 - December 16, 1983, Bangkok - a report 1984
- COASTAL III/I/8.3      Proceedings of the Asian Symposium on Mangrove Environment 25-29 August 1980, Kuala Lumpur, Malaysia, 1984
- COASTAL III/I/8.4      Comparing coral reef surveys methods (Unesco/UNEP), Phuket, Thailand, December 13-17, 1982 - a report of a regional workshop, 1983
- COASTAL III/I/8.5      Workshop and Training course on coral taxonomy (Unesco/UNEP) Phuket, Thailand, February 10-26, 1984 - a report (draft) in preparation.
- COASTAL III/I/8.6      Coastal zone resource development and conservation in Southeast Asia, by G.A. Knox and T. Miyabara (with special reference to Indonesia) Unesco-Regional Office for Science and Technology in South East Asia (ROSTSEA), 1984

Regional activities in Latin America and the Caribbean

- COASTAL III/I/9.1 Unesco (COMAR) regional project for research and training on coastal systems of Latin America and the Caribbean, and its relations with the Continental Shelf (COSALC), the project document
- COASTAL III/I/9.2 Coral reefs, seagrass beds and mangroves: their interactions in the coastal zones of the Caribbean, a regional workshop, May 1982, St. Croix, U.S. Virgin Islands - a report, 1983
- COASTAL III/I/9.3 Introduccion a la ecologia del Manglar by G. Cintron and Y. Schaeffer-Novelli, Regional Office for Science and Technology for Latin America and the Caribbean (ROSTLAC) 1983.
- COASTAL III/I/9.4 Proyecto para investigacion y formacion de recursos humanos sobre lagunas costeras de America latina - Etape inicial - Reunion de planeacion, 12-13 de Junio, Mexico. Informe

Regional activities in Africa

- COASTAL III/I/10.1 Field Workshop on research methodologies in estuary and mangrove of Saloum, Senegal - a technical report. In press

Regional activities in the Mediterranean, Redsea and the Gulf

- COASTAL III/I/11.1 Bibliographical list on coastal lagoons and salt marshes along the Southern Mediterranean coast (in French and English) by P. Kerambrun

Regional activities in Europe

- COASTAL III/I/12.1 International research project on Venice lagoon.

## UNESCO TECHNICAL PAPERS IN MARINE SCIENCE

Titles of numbers which are out of stock

No.	Year	SCOR WG	No.	Year	SCOR WG
1	1965	WG 10	13	1969	WG 15
2	1965	WG 15	14	1970	WG 10
3	1966	—	15	1973	WG 29
4	1966	WG 10	16	1974	WG 10
5	1966	WG 15	17	1974	WG 21
6	1967	WG 20	18	1974	WG 33
7	1968	—	20	1975	—
8	1968	WG 10	21	1975	WG 27
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10	1969	—	23	1975	WG 21
11	1969	WG 21			
12	1969	—			