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ACTIVITIES OF THE UNITED NATIONS
IN THE FIELD OF
OCEAN ECONOMICS AND TECHNOLOGY

The attached paper has been prepared by the
Ocean Economics and Technology Office,
Department of International Economic and Social Affairs,
the United Nations,
in response to a request from the Executive Council
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PREFACE

At its eleventh session convened in Mexico City from 26 February to 6 March 1979, the Executive Council of the Intergovernmental Oceanographic Commission adopted resolution EC-XI.16 entitled "Activities of the United Nations in the field of Ocean Economics and Technology". In the operative paragraph of the resolution, the Executive Council requested "The Chairman of IOC to consult with the Secretary-General of the United Nations with a view to the submission by the Ocean Economics and Technology Office of a concise report to the Assembly at its eleventh session, which report would review the ongoing and planned activities of the United Nations in the field of ocean economics and technology, identifying when appropriate the interrelationships between such activities and those of the Commission."

The present report has been prepared in accordance with that request for the purpose that is also set out in the resolution - namely, of apprising the Assembly of activities of the United Nations in the field of ocean economics and technology so that it may take account of such activities in adopting appropriate measures regarding the future role and functions of the Commission. **While the report highlights** only the most salient and direct links between United Nations activities in this field and those of the Commission in marine science, it is axiomatic that the full range of activities co-ordinated by the IOC -- in ocean science, ocean services, and training, education and mutual assistance in the marine sciences (TEMA) -- substantially contribute to the scientific knowledge base on which the development-oriented United Nations programme in ocean economics and technology is built. The instances in which the findings and results of IOC activities have contributed to the implementation of the Ocean Economics and Technology programme are too numerous to catalogue and thus have not been identified explicitly in the report.

It should be also noted that in the present report, the phrase "Activities of the United Nations in the field of ocean economics and technology" has been interpreted to refer to those activities carried out under the major programme "Ocean Economics and Technology" so designated in the medium-term planning and programming documents of the United Nations. As this programme is implemented only by United Nations Headquarters and has no counterpart in programmatic terms in any of the regional commissions or the autonomous or semi-autonomous organizations of the United Nations, it is unique.^{1/}

I. THE EVOLUTION OF A UNITED NATIONS ROLE: AN OVERVIEW

A. Introduction

It has often been observed that the international community is looking increasingly to the oceans to satisfy its growing needs for food, minerals, energy and for space itself in which to develop and expand economic activities. Indeed, the last two decades have witnessed a rapid growth of global interest in the oceans. A number of factors underlie this phenomenon: the challenges and rewards of scientific investigation, stimulated by the oceanographic successes of the 1960s; concern about future scarcities of non-renewable resources; dislocation and hardship aggravated by energy shortages; death and deprivation resulting from famine; the growing pressures

^{1/} It should be noted, however, that the United Nations Regional Commissions and certain of the autonomous and semi-autonomous organizations of the United Nations also carry out marine-related activities, frequently, under the "natural resources" heading. For example, the Economic Commission for Africa has established a special unit dealing with resources of the sea. The United Nations Conference on Trade and Development (UNCTAD) carries out work related to sea-bed minerals using econometric modeling to examine the potential impact of the production of sea-bed minerals on future levels of commodity prices and on the export earnings of the developing producing countries.

created by the concentration of populations and economic activity at the coastline; and the emergence of a more vigorous environmental consciousness as well as a greater appreciation of the role of the oceans in determining weather and climate.

Within the United Nations family of organizations, the establishment of the Intergovernmental Oceanographic Commission in 1960 for the purpose of promoting scientific investigation with a view to learning more about the nature and resources of the oceans, through the concerted action of its Member States, was an early landmark in the development and diversification of international activity that occurred as part of the 'trend toward the oceans'.

B. United Nations involvement:
The Legislative Context

Within the United Nations itself, the process of involvement in marine affairs was initiated in 1966 when the Economic and Social Council, in resolution 1112 (XL), considered "that the mineral and food resources of the sea, beyond the continental shelf excluding fish, constitute reserves of raw materials which are as yet not fully being utilized, and that the rational use of these resources to ensure optimum yield and minimum waste is of vital importance to all countries". In the same year the General Assembly in resolution 2172 (XXI) echoed this view in stating that "the effective exploitation and development of ocean living and mineral resources can raise the economic level of peoples throughout the world, and in particular of the developing countries".

In 1968 the Economic and Social Council took note of the "the growing interest of the world community in the problems related to the oceans and their resources" and recognized that "further progress in the development and utilization of marine resources would depend greatly on more specific knowledge being gained on the various characteristics of marine environmental conditions" (resolution 1380 (XLV)). The Council also observed that "one of the main obstacles to the development of marine science and technology was the shortage of experts and qualified personnel, particularly in the developing countries" (resolution 1382 (XLV)). In the same year, the General Assembly also took note in resolution 2414 (XXIII) of the "growing interest of the world community in problems related to the oceans" and recognized "the need for extensive exploration and research in order to develop the wealth of the sea for the benefit of all mankind, irrespective of the geographical location of States, taking into account the special needs and interests of developing countries". Moreover, the General Assembly considered it "important to promote international co-operation for the exploration and exploitation" of such resources and that it was "essential to provide, within the United Nations system, a focal point for the elaboration of desirable measures of international co-operation, taking into account alternative actual and potential uses of the sea-bed and the ocean floor, and the subsoil thereof, and for the co-ordination of the activities of international organizations in that regard" (resolution 2467 A (XXIII)).

Addressing the potential problems associated with the exploitation of such resources, the General Assembly in resolution 2750 A (XXV) reaffirmed that "the development of the area and its resources /should/ be undertaken in such a manner as to foster the healthy development of the world economy and balanced growth of international trade, and to minimize any adverse economic effects caused by the fluctuation of prices of raw materials resulting from such activities". In the same year, the Economic and Social Council drew attention in resolution 1537 (XLIX) to trends and new developments in uses of the sea and to the possibility of conflict between uses as they proliferated and grew more intense; and in 1971 in resolution 1641 (LI) it drew attention to "the fast growing economic importance of the off-shore mineral potential and its increasing contribution to the economies of developing countries".

Concern about the development specifically of coastal marine resources has more recently been reflected in United Nations legislation. In 1972 the General Assembly, affirming that the interrelated problems of ocean space need to be considered "as a whole", underlined "the importance to coastal States, for purposes of economic development and social progress, of the ocean resources adjacent to their coasts" (resolution 3029 C (XXVII)); and in 1973 the Economic and Social Council called attention to "the fact that the coastal areas in many countries, particularly the developing countries, represent one of

their most valuable possessions and that the proper management and development of these areas constitutes an important factor in their national development planning" and pointed to "the need for an integrated approach in the consideration of the problems involved in the various uses of the sea, in order to achieve the proper management of ocean resources and uses" and for an "integrated information base" to support such an approach (resolution 1802 (LV)).

Two years later, reaffirming the importance of an integrated approach to coastal area development, the Council in resolution 1970 (LIX) endorsed a work programme in this field and underscored the need for measures to promote the better and wider application of marine technology suitable for developing countries.

Most recently, in 1977, the Council by resolution 2099 (LXIII) provided further impetus to collaboration between the United Nations, the Intergovernmental Oceanographic Commission and the Food and Agriculture Organization in the development of Aquatic Sciences and Fisheries Information System (ASFIS) and to the elaboration of activities in the fields of coastal area development and marine and coastal technology.

C. The Development of a United Nations Capability

These initiatives by United Nations intergovernmental bodies had two salient and contrasting characteristics which shaped the ensuing United Nations programme of activities in marine affairs. On

the one hand, many of them were very broad in scope, bridging in many cases the established sectoral mandates of United Nations organizations and various disciplines. They thus set the stage for an intensification of interaction among United Nations organizations in the marine field. Similarly, with increasing explicitness these initiatives drew attention to the need for frameworks of action within which the expertise and inputs of United Nations organizations could be integrated as, for example, in the case of integrated coastal area development.

In this and in other broad intersectoral problem areas, it devolved upon the United Nations Secretariat to define its own areas of substantive competence in the light of the existing mandates and competencies of other United Nations organizations.

On the other hand, the legislative initiatives of United Nations intergovernmental bodies established a distinct and comparatively well-defined mandate for Headquarters in the field of marine minerals, and specifically the economic and technological aspects of their development.

To summarize, the United Nations programme in the field of ocean economics and technology developed directly in accordance with the requirements of ECOSOC and the General Assembly, and as the need arose, to the preparations for and convening of the Third United Nations Conference on the Law of the Sea. Its development, therefore, can be viewed as a response to a strongly expressed need for a central capability at United Nations Headquarters which, not oriented to

established sectoral marine concerns, would be in a position to respond to newly emerging problems falling outside of, or overlapping the mandates of other United Nations organizations, thereby providing both a source of specialized expertise as well as of broad perspective.

At the organizational level, the momentum of events is demonstrated by the rapidity with which the United Nations capability developed from the initial ad hoc Unit for Marine Science and Technology established in September 1967; its transformation 1970 into an Ocean Economics and Technology Branch within the Resources and Transport Division; and, then in 1973, in recognition of its growing responsibilities, into the Ocean Economics and Technology Office (OETO) with a separate programme and budget. The viability and independence of the Office as a separate organizational entity within the United Nations Secretariat was reaffirmed in the restructuring of the Economic and Social Sectors of the United Nations implemented in 1973. Headed by an Assistant-Director, the Ocean Economics and Technology Office presently has ten professional staff members and functions under the Office for Development Research and Policy Analysis of the Department of International Economic and Social Affairs.

D. Co-ordination

Traditionally in the United Nations system co-ordination has been viewed as a means for avoiding or minimizing duplication of work among

United Nations organizations whose mandates, amenable as they are to broad interpretation, are liable to overlap in various activity areas. In this context, co-ordination helped facilitate "agreement on concepts, a sorting out of functions and the establishment of criteria and guidelines in respect of closely related activities of different agencies".^{2/} Each of the organizations concerned was thus in a better position to define and implement a programme of activities in accordance with the priorities set by its legislative and governing body(ies) and under the objectives based thereon and in this process to take account of related work elsewhere in the system either with a view to excluding it by definition from its own activities or with a view to utilizing (rather than duplicating) it when such work could not be excluded.

Under the circumstances that have emerged, this traditional function of co-ordination continues to play a role, but one which is secondary and supplementary. The main purpose of co-ordination in the present context is less to avoid duplication than to ensure that the full range of expertise available within the system is assembled and integrated in the implementation of inherently co-operative activities. The emphasis therefore is less on delimitation of competencies, though this is still necessary, than on the synthesis of competencies.

^{2/} Martin Hill, "Towards Greater Order, Coherence and Co-ordination in the United Nations System" (E/5491), p.38.

Underlying this changed emphasis is the fact that policy directives set forth by Governments and expressed through their representatives in the legislative and governing bodies of United Nations organizations, can no longer, as adequately as in the past, be implemented by a programme of activities that is self-contained within the mandate of any given organization. While United Nations legislative bodies, as indicated above, have been the primary source of initiatives requiring interagency collaboration, the governing bodies of the functional organizations too have more frequently departed from a narrow technical approach to priority setting and policy guidance.

Evolving as it did, the Ocean Economics and Technology Office has necessarily acquired a catalytic and 'lead agency' role for United Nations initiatives requiring system-wide involvement. A considerable part of the Ocean Economics and Technology programme, therefore, is highly interactive with the related marine programme or activities of other United Nations organizations, including prominently those of the IOC, and its effectiveness is accordingly linked closely to the effectiveness of interorganizational co-ordination. The policy framework for implementing this co-ordination has been provided primarily through the following mechanisms:

The Administrative Committee on Co-ordination (ACC)

In 1960, the ACC established the Sub-Committee on Oceanography and entrusted it, inter alia, with the task of ensuring co-ordination

with the newly established Intergovernmental Oceanographic Commission (IOC). Its orientation, at the time, clearly was toward marine science. However, the most salient feature of the development of the Sub-Committee from its inception was the constant broadening of its terms of reference, which was especially notable after 1966 as the United Nations became increasingly involved in marine affairs.

Thus, at its sixth session in 1966, the Sub-Committee recommended that its name be changed to Sub-Committee on Marine Science and Its Applications in order to best reflect the actual content of its work. This was approved by the ACC. Then, at its seventeenth session in 1977, the Sub-Committee revised, again broadening but also giving precision to, its terms of reference, and recommended again that its name be changed, this time, to Sub-Committee on Marine Affairs.

Membership in the Sub-Committee has been open to all United Nations organizations and regular participants have included the United Nations, FAO, IMCO, WHO, WHO, IPU and UNESCO and its Intergovernmental Oceanographic Commission (IOC). With the broadening of its terms of reference, participation of United Nations organizations at the annual sessions of the Sub-Committee grew to include UNCTAD, UNEP and, most recently, some of the regional commissions, as did interest on an even broader interagency basis in the results of its work.

Following the restructuring of the economic and social sectors of the United Nations, the Sub-Committee on Marine Affairs, as was the case for most standing subsidiary bodies under ACC, was superseded by a system under which flexible ad hoc arrangements would be specifically tailored to individual requirements for co-ordination.

Inter-secretariat Committee on Scientific Programmes Relating to
Oceanography (ICSPRO)

Partly as a result of the broadening of the terms of reference of the Sub-Committee and its increasing orientation to the developmental aspects of marine affairs, a need was created for a more specialized co-ordination mechanism in the field of marine science, particularly in support of the activities of the IOC. Thus in 1969, the Executive Heads of the United Nations organizations concerned with marine science (UN, FAO, Unesco, WMO and IMCO) formed an Inter-secretariat Committee on Scientific Programmes Relating to Oceanography (ICSPRO), the objective of which was to contribute to the development of effective forms of co-operation between organizations of the United Nations system substantially concerned with oceanic programmes and thus avoid duplication and overlapping in the planning and implementation of an expanded programme of international co-operation in marine science.

The establishment of ICSPRO was commended by the United Nations General Assembly in resolution 2560 (XXIV) in 1969. Both the mandate and membership of ICSPRO are more limited than the mandate and membership of the Sub-Committee on Marine Affairs and, unlike the Sub-Committee, ICSPRO is outside the framework of ACC.

As members of ICSPRO, the United Nations organizations concerned undertook an obligation to support the IOC, through, inter alia, providing staff to the IOC Secretariat on secondment or through other support in kind.

The United Nations for its part, through the Ocean Economics and Technology Office, has annually hosted a meeting of an IOC Subsidiary body.^{3/} This support was formally authorized by the ECOSOC in 1974 in its Resolution 1893 (LVII).

As for the relationship between ICSPRO and the Sub-Committee on Marine Affairs, and now by extension, the superseding ad hoc arrangements under ACC auspices, the following extract from the report of the Sub-Committee at its seventeenth session is relevant:

"There is some overlapping between the work of the two bodies. To a certain extent this is inevitable, in light of the history of the development of the ICSPRO and the Sub-Committee and the increasing scope of IOC programmes.

"Moreover, given the fact that ICSPRO has only limited membership (United Nations, FAO, UNESCO, WMO and IMCO), owing to the rather rigid qualifications for membership laid down in the ICSPRO agreement (which entail financial assistance and support in kind including seconding staff to IOC), certain questions being dealt with by ICSPRO but also of wider interagency concern would in the course of events have to be taken up in the Sub-Committee. It is unlikely that any completely satisfactory delimitation of respective mandates could be arrived at which would eliminate the need for some decisions on a case-by-case basis.

"This interaction would not vitiate the principle that no marine-related issue or problem of interagency concern should be excluded from the Sub-Committee's purview nor would it impinge upon ICSPRO's independence from the ACC structure. Rather, it should facilitate efforts by the Sub-Committee to direct its attention to ongoing activities that clearly require action on the broadest interagency basis and to newly-emergent problems that fall mainly outside ICSPRO's purview." ^{4/}

^{3/} Working Group on International Oceanographic Data Exchange, 1973; International Co-ordination Group for GIPME, 1974; the Working Committee on International Oceanographic Data Exchange, 1975; the FAO/IOC Joint Panel on Experts on ASFIS, 1976; the Working Committee for TEMA, 1977; the Working Committee on International Oceanographic Data Exchange, 1978/1979.

^{4/} See CO-ORDINATION/R.1199, 3 February 1977, Annex III, "Institutional and co-ordination arrangements in the field of marine affairs. Background paper prepared by the United Nations."

Joint Group of Experts on the Scientific Aspects of Marine Pollution
(GESAMP)

In 1967, in **recognition** of the fact that marine pollution problems were of concern to several organizations and subsidiary bodies within the United Nations family, the United Nations, together with several other United Nations organizations, agreed to establish a Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) to advise them and, through them, their Member States, as appropriate, on scientific aspects of marine pollution. The establishment of this Joint Group, whose members are appointed in their individual capacities by agreement among the sponsoring agencies and whose meetings are serviced by technical secretaries from the sponsoring agencies, was intended to encourage the various organizations concerned to disband at their discretion or to refrain from establishing other interdisciplinary groups on the subject and so avoid duplication of efforts. The sponsoring organizations of GESAMP now consist of IMCO, FAO, UNESCO, WMO, WHO, IAEA, UN and UNEP.

As a sponsor of GESAMP, the UN provides a technical secretary who co-ordinates the preparation of GESAMP sessions with the technical secretaries of the other sponsors. The United Nations through its Ocean Economics and Technology Office has also sponsored and serviced a GESAMP Working Group on the Pollution Implications of Coastal Area Development, which concluded its work in 1979.

Law of the Sea Conference

In organizational and budgetary terms, the Ocean Economics and Technology Office is an entity separate from and independent of the Secretariat established to service the Third United Nations Conference on the Law of the Sea. However, co-operation between the two units has been close and effective. Both during the preparation for the Conference and in the servicing of its several sessions, the Ocean Economics and Technology Office has prepared a number of formal documents and informal studies at Government request on the economic and technical aspects of certain subjects under consideration, particularly in regard to the exploitation of deep sea minerals and also to technology transfer. The Office has also provided administrative support in servicing the Conference.

II. THE UNITED NATIONS PROGRAMME IN OCEAN ECONOMICS AND TECHNOLOGY

A. The Marine Dimension in Development

Oceans, including semi-enclosed areas, cover approximately 71 per cent of the earth's surface. The marine dimension in development is a short-hand term referring to the existing and potential contribution to development of the resources within, and the uses of this area. Obviously, such an open-ended definition lacks operational significance. The extent to which a nation seeks to incorporate marine resources and uses into its development process depends upon a number of factors,

among them: the marine resources and space to which it has access, its priorities vis-à-vis viable alternatives and its capabilities in terms of technology, human resources and finance. Nonetheless, the expression 'marine dimension in development' has the merit of encouraging more serious attention in development planning to the marine sector as a whole.

1. Coastal Areas

This is particularly the case for the coastal area. It is now generally recognized that, as the ECOSOC stated in 1973, "coastal areas in many countries, particularly the developing countries, represent one of their most valuable possessions and that the proper management and development of these areas constitutes an important factor in their national development planning".^{5/} Among the manifold activities, existing or potential, associated with the coastal area are: shipping and transport, port and harbour construction, dredging, near-shore mineral and hydrocarbon exploration and exploitation and the structures associated with these activities, ocean energy production, near-shore terminals and storage facilities, pipelines and underwater cable laying, waste disposal, near-shore scientific research, various special purpose platforms and structures, marine parks, recreation and so on.^{6/}

^{5/} E/Res. 1802 (LV). The importance of coastal areas and the problems associated with their development are discussed in E/5648, 8 May 1975, Coastal Area Management and Development: Report of the Secretary-General.

^{6/} For a survey of some of these activities, see E/5650, 30 April 1975, Uses of the Sea: Study prepared by the Secretary-General, paras. 58-59.

2. Extended Marine Jurisdictions

While for many countries the near-shore coastal area will remain or become the focus of marine economic activity, the establishment of extended marine jurisdiction multiplies both the potential benefits and the needs and responsibilities of coastal states.

Over 85 coastal states have now established extended marine resource jurisdictions, generally to 200 nautical miles, in the oceans adjacent to their land masses, claiming sovereignty and/or jurisdiction over resources therein. This trend is expected to become universal. When this occurs (except in cases where geographical proximity between two or more states dictates more restricted delimitations), over 35 per cent of the area of the world's oceans would be brought under national jurisdiction. Although the potential economic value in the aggregate of extended jurisdictions will vary considerably from country to country, in global terms the economic significance of the area comprised within the 200-mile limit is very great. For example, it has been estimated that all of the presently exploitable marine mineral resources and most of those having potential economic value in the next several decades are located within this area. Moreover, since this area includes a part of the deep ocean basin, particularly around small volcanic islands and archipelagos and the area off the coast of North and South America, there is potential for commercial mining of manganese nodules. All of the proved off-shore hydrocarbon reserves also fall within this area, as do about 80-90 per cent of the fisheries resources presently under commercial exploitation.

3. The Marine Dimension Beyond National Jurisdictions

The portion of the marine dimension outside extended jurisdictions is also significant, particularly in the case of manganese nodules and certain unconventional species of living resources such as Antarctic Krill. Most (but not all) mine-grade nodules, including all of the most favourable mine-sites identified in the North Pacific Ocean, fall within this area, which has been declared the common heritage of mankind.^{7/} While in the foreseeable future it is unlikely that other mineral deposits will be exploited, the possibility does exist that dredging of phosphorites on and beyond the shelf may eventually be carried out. Hydrocarbon potential is most promising on the remaining continental shelf and upper slope beyond 200 nautical miles, though the ultimate hydrocarbon resources are estimated to be only 13 per cent of total off-shore resources.

As for living resources, three groups of species are attracting attention as possible valuable unconventional resources -- euphasid crustaceans, especially the krill, a small shrimp-like animal, of the Southern Oceans; small pelagic crabs, small fishes occurring in the sub-surface layers in most parts of the ocean; and oceanic squid. These resources lie, to a varying extent, outside 200-mile resource jurisdictions but as they do not occur wholly outside such jurisdictions, they also constitute potential fisheries resources within resource jurisdictions.^{8/}

^{7/} General Assembly Resolution 2749 (XXV), 17 December 1970.

^{8/} See FAO document C 77/21, paragraphs 21-31.

Clearly long-range development planning should take account of these resources as well, particularly in the nearer term of manganese nodules, the commercial mining of which is expected in the late 1980s, with consequent implications for the supply, prices and markets of their constituent metals; and of krill, the commercial fishing of which holds out the probability of becoming economically viable.

4. Ocean management

As the above illustrates, the primary responsibility for the development and management of most of the existing exploitable resources and uses of the oceans falls or will fall on each coastal state. Nonetheless, because certain management problems and needs associated with the utilization of extended resource jurisdictions cut across such jurisdictions owing to the geographical proximity of states, particularly within marine regions, or to the nature of the problem, coastal states will inevitably be subjected to pressure toward bilateral and regional co-operation. Regional co-operation, therefore, will also emerge as an important component of ocean management.

a. National efforts

Coastal states increasingly are aware of and are making efforts to take account of their marine potential within particular sectors, particularly fisheries and off-shore petroleum and natural gas, in their development planning. However, in the light of the range of opportunities associated with marine resources and ocean space,

particularly with the extension of 200-mile jurisdictions, and of the needs for skilled manpower, capital resources and technology that must be met in order to realize this potential, little more than a start has been made in most cases in incorporating marine resources and uses in development planning in a comprehensive and rational manner. Generally speaking, there is great scope for progress within economic sectors. In addition, and partially as a precondition to more effective sectoral efforts, national development planning must evidence a greater appreciation of the need for an ocean policy as a framework for setting priorities, and recognition of coastal area/extended jurisdiction management as a component of national development planning. There is also a need for identifying the requirements of and initiating measures to establish a marine capability in relation to national priorities - that is, a scientific and technological capability supportive of marine activities designated for development.

b. The international level

Against this background, greater effort at the international level is crucial. It is at this level that impetus and assistance must be provided in imaginative and innovative ways for overcoming the obstacles and constraints that impair, and may necessarily limit the horizons, ambitions and ultimately the impact of national development planning in the marine area, as in other areas. Yet, the Interna-

tional Development Strategy for the Second United Nations Development Decade contains only one section on "Invisibles including shipping", with recommendations for the development of shipping lines in developing countries and improvements in the liner conference system; the word "fisheries" occurs only once, in a paragraph recommending "appropriate strategies for agriculture (including animal husbandry, fisheries and forestry)."^{2/}

The Programme of Action for the Establishment of a New International Economic Order refers only once to the sea, this is a paragraph enjoining efforts "to refrain from damaging or deteriorating natural resources and food resources, especially those derived from the sea, by preventing pollution and taking appropriate steps to protect and reconstitute those resources".^{10/}

While the virtual omission of the marine dimension from global development planning over the last decade was already significant, it will become increasingly untenable in the decade of the 1980's and beyond, particularly as an increasing number of coastal states extend national resource jurisdictions seaward in one form or another.

Broadly speaking, the overall goal of the United Nations Ocean Economics and Technology programme is to assist efforts at both the national and the international levels to harness the marine dimension to the development effort. The activities that are being implemented by the Ocean Economics and Technology Office to that end are described in the following Section B.

^{2/} General Assembly Resolution 2626 (XXV), 24 October 1970, "International Development Strategy for the Second United Nations Development Decade".

^{10/} General Assembly Resolution 3202 (S-VI), 1 May 1974, "Programme of Action on the Establishment of a New International Economic Order".

B. Programme Activities

1. Minerals

The mineral activities of the Ocean Economics and Technology programme are subdivided into three categories: sea-bed minerals, nearshore hard minerals and land-based minerals. The overall objective of these activities is to provide information that will improve resource allocation and decision-making at the national and international levels in the mineral sector, recognizing the importance of this sector in development planning.

Sea-bed minerals

Until recently sea-bed minerals activities, which have been the mainstay of the ocean economics and technology programme since the early 1970's, have been carried out largely in response to, and therefore, were oriented to the needs arising from, the preparations for and the convening of the Third United Nations Conference on the Law of the Sea. The purpose of outputs was to provide economic and technical guidance for political and policy decisions within the context of the Conference. As the needs of the Conference for technical information moved from the general to the specific, the outputs completed required an ever greater degree of technical expertise in their preparation and more often took the form of informal papers and increasingly direct technical advice in response to ad hoc requests for assistance.

As a result of this process, the Office was in a position by 1977 to develop a detailed programme of work in the field of sea-bed minerals. The rationale for the programme derives from the fact that the availability of certain primary metals, including copper and nickel, constitutes a basic condition for growth. Current estimates of the global stocks of these resources, however, have focused almost exclusively on land-based sources and generally have not taken into account sea-bed manganese nodules, which, until a few years ago, were considered an improbable source of metals. However, given the recent technological advances for exploiting the sea-bed and the production in the near future of copper, nickel, cobalt and possibly manganese from sea-bed nodules, the omission of sea-bed nodules from estimates of the available stock and from projections of the future stock of mineral resources will become increasingly significant. The inclusion of this resource dimension would improve the accuracy and reliability of resource estimates and therefore the utility of models, strategies and planning exercises which build upon such estimates. Production of large volumes of these metals from sea-bed nodules can be expected to affect market prices, earnings of mineral-exporting countries and the flow of investment into capacity expansion in land-based mining. This in turn would have implications for long-term mineral development policies in both developed and developing countries. Sea-bed nodule production may offer opportunities for developing nations to participate, directly or indirectly, in a new-style mining venture.

This expanded programme was designed so that it could, as the need arose, continue to meet the requirements of the Law of the Sea

Conference and also increasingly to respond to the needs and directives of other intergovernmental bodies such as the Committee for Natural Resources of the ECOSOC, as well as of expert bodies such as the Committee for Development Planning and other units of the United Nations Secretariat in connexion with the formulation of a new international development strategy and the implementation of the New International Economic Order. In addition, the programme of work took account of the need to provide information to expert users -- government planners and resource economists -- working at the national level in developing countries.

An important event in guiding the formulation of specific projects under this work programme was the convening by the United Nations Ocean Economics and Technology Office of a Group of Experts Meeting on Sea-Bed Mineral Resources Assessment in November 1977.^{11/} The meeting brought together 18 recognized world authorities for the purpose of examining the basic elements that need to be considered in making any estimate of the availability of sea-bed minerals in the future. Specifically, the experts were called upon to:

- (1) isolate those factors which account for the large variability among estimates of sea-bed resources and future production volumes;
- (2) establish statistical confidence limits for certain key parameters;

^{11/} The proceedings of the Group of Experts Meeting have been published as Manganese Nodules: Dimensions and Perspectives, D. Reidel Publishing Company, Dordrecht, Netherlands, 1979.

(3) determine the technical characteristics of the future nodule industry; and

(4) determine what basic data are necessary for future work in estimating sea-bed resources and anticipating production volumes.

Taking into account of the results of the expert meeting and of the needs of users within and outside the United Nations, the Ocean Economics and Technology work programme in this field includes several discrete projects that address at a concrete technical level a number of prominent issues and problems associated with the exploitation of sea-bed nodules. These include a project on developments in sea-bed mineral mining activities under which the activities of the international consortia involved in sea-bed mineral exploitation and development are monitored and analyzed on a continuing basis; and a project that will examine the reliability of the primary data base for resource evaluation.

Other projects will provide an economic evaluation of nodule processing technology and a critical evaluation of the mine site concept in ocean mining, while still another will construct a financial balance sheet providing a financial analysis of a prospective nodule mining venture.

Work on several of these projects has already begun and in the case of others, it will commence by 1980.

Nearshore Hard Minerals

Activities related to nearshore hard minerals are a relatively new addition to the Ocean Economics and Technology Office, having been

introduced as a separate programme element in the 1978-1979 programme budget. At the present stage, the problem addressed in this area is the lack of readily available, standardized data on nearshore hard mineral occurrences. Work has begun on a project aimed at constructing a uniform reporting system for nearshore hard mineral occurrences and at developing a computer programme for storing, recalling and cross-checking any reported data. The results of this project, which are expected to be published, will facilitate more effective exploration and development work on the part of governments and national and international organizations in this field.

Land-based Minerals

Following the restructuring of the economic and social sectors of the United Nations in 1978 in accordance with General Assembly resolution 32/197, the minerals (land-based) capability retained by the new Department of International Economic and Social Affairs within its terms of reference, was attached to the Ocean Economics and Technology Office and programme. Subsequently, an initially modest programme of work was formulated consisting of the following projects. The first seeks to assist practitioners in developing countries who are responsible for planning and managing mining operations to obtain more accurate short-term forecasts of minerals prices. This will be done through an examination of the techniques and methods generated by recent advances in applied statistics for analyzing and forecasting time-series.

A second project will examine the industrial use of metals in developing countries with a view to analyzing input co-efficients of various metals across sectors and across a small sample of developing countries. The results of this work are expected to assist developing countries to determine their absorption requirements for metals in various consuming and producing sectors in the light of established and projected economic growth rates.

Over the long run, work related to land-based minerals will examine the issues of the adequacy of supplies, and of minerals prices and their stabilization taking into account the potential of sea-bed mineral resources, and drawing particularly upon the work in the minerals field that will be undertaken by UNCTAD in the context of its integrated programme for commodities, by the World Bank on questions relating to financing and lending practices, by the United Nations Department of Technical Co-operation for Development and upon relevant activities of the regional commissions.

2. Uses of the Sea and Ocean Management

The overall objective of work under this heading is to provide economic and technical information on developments and trends pertaining to existing and potential uses of marine resources and ocean space and on the rational management of such uses to assist Governments in integrating the marine dimension into their national development planning. Three types of activity are being implemented.

Comprehensive Studies

The development of marine resources and the uses of ocean space are continuing to grow and intensify across a broad range of activities. The great diversity of ocean-related activities and their existing and potential interrelationships, ranging from conflict to mutualism, point to the need for comprehensive analytic information on the existing situation, and more important for planning purposes on major trends and pending foreseeable developments. Because such information necessarily involves a large number of disciplines and sectoral expertise, a system-wide approach to its preparation has been implemented. To this end, the United Nations, through its Ocean Economics and Technology Office, has served as a focal point for the co-ordination of inputs from United Nations organizations for the preparation of comprehensive reports on uses of the sea, which are submitted to the ECOSOC. Two such reports have so far been prepared (E/5120 in 1972 and E/5650 and corr.1 in 1975) with assistance from the IOC and other United Nations organizations, and others will be prepared as developments warrant.

Marine Trends

An other type of activity under the Ocean Economics and Technology programme addresses the impact and implications of salient trends in the field of marine affairs. In a note on uses of the sea submitted to the ECOSOC in 1977,^{12/} two such trends were identified as warranting

^{12/} E/5972, 5 May 1977. Uses of the Sea. Note by the Secretary-General. The document annexes a concise report on progress in the field of marine science, prepared by the IOC as well as FAO.

further in-depth treatment: the trend toward the extension of national resource jurisdictions to a 200-mile seaward limit and the trend toward regional co-operation in marine affairs.

The needs -- physical, economic, human and technological -- associated with the use of extended marine areas will place additional demands upon existing national resources and capabilities and thus upon the programmes and activities of the concerned United Nations organizations. Meeting these needs and bringing capabilities to bear on the exploitation of resources within extended marine areas in a rational and efficient manner also underline the importance of "ocean management" at the national level -- that is, the importance of establishing an ocean policy and ocean priorities, developing a management plan for the use of ocean areas under national jurisdiction, and instituting or improving both arrangements and mechanisms for co-ordination as well as the legislative framework that facilitate comprehensive and coherent planning and management.

The trend toward regional co-operation in turn reflects the growing importance of the regional component of ocean management. This trend too presents a challenge to United Nations organizations to adapt their structures and activities to regional approaches to certain marine problems that cut across disciplines and sectors just as they cut across national jurisdictions.

Under the Ocean Economics and Technology programme, a report on the above trends is under preparation in co-operation with

the IOC and the other concerned United Nations organizations, for submission to the ECOSOC in 1980. The portion of this report dealing with regional co-operation will take account of and draw upon related work on this subject in the context of the IOC being carried out by the IOC Secretariat for submission to the Assembly at its present session.

This preliminary report will be followed up by separate studies planned for completion by the end of 1981, that will deal respectively with ocean management and the marine dimension in development, and with the opportunities and problems associated with regional co-operation and the conditions for its effective implementation. Again, the report on the latter subject will take account of any developments within IOC and other United Nations organizations.

In addition, a note verbale and accompanying questionnaire currently under preparation, is planned to be sent to United Nations Member States, in order to establish a more current and complete information base that will provide inputs into the above studies and enable refinements and adaptations to be made in programme activities according to national needs.

Ocean Energy

Concomittant with the above activities which are broad in scope, particular existing and potential ocean resources or uses will be identified for special attention. Currently, this type of activity under the Ocean Economics and Technology Programme focuses on sources of ocean energy, from conventional hydrocarbons as well as new and renewable sources.

Under the latter, the Ocean Economics and Technology Office, in close co-operation with the Center for Natural Resources, Energy and Transport of the UN's Department of Technical Co-operation for Development as well as other concerned UN organizations, (particularly Unesco and its IOC), is responsible for the ocean energy segment (one of six subject areas) to be covered by the UN Conference on New and Renewable Sources of Energy scheduled for 1981. The preparatory work now underway is directed toward setting-up an ocean energy panel of Government-nominated experts, the first session of which will be hosted by the IOC at Unesco Headquarters in the latter part of 1979. Drawing partly upon this Conference preparatory work, which focuses on new and renewable energy sources and applications in developing countries, the Office will prepare a study of broader scope that will assess the potential impact of new and renewable sources of ocean energy on the global energy situation.

Follow-up activities in this area will be developed primarily in the light of the Conference recommendations.

Concurrently, work will be carried out on the evaluation of the petroleum and natural gas potential of the oceans in light of the critical factors--geologic, economic, technical and policy-- that influence its development. Seven technical papers on various aspects of this subject will be prepared by internationally recruited experts for consideration at an expert meeting in 1980, at which the overall evaluation will be made.

The results of this expert meeting, which will be published in order to receive wide dissemination, will also provide guidance for the elaboration of further activity regarding marine hydrocarbons.

3. Coastal Area Management and Development

Activities under the Ocean Economics and Technology programme in this field were launched in 1973-1974 with the preparation of a comprehensive conceptual study, requested by the ECOSOC, and the convening in November 1974 at United Nations Headquarters a Group of Experts Meeting on Coastal Area Development in order to assist in preparing practical proposals for action at the regional and sub-regional levels.^{13/}

The need at this initial stage was for information, for creating awareness of and familiarity with concepts and problems and activities associated with an integrated approach to coastal area development, and for establishing the co-operative framework for a system-wide effort. These activities in turn provided the basis for the elaboration of more action-oriented measures (1) in the form of studies on the components of an integrated approach to coastal area management and on particular problems (e.g. erosion) or physical contexts (e.g. island countries); and (2) in the form of practical assistance in the areas of training and substantive support for technical co-operation (workshops, field projects). Under both forms of activity, close co-operation with UNEP has been developed within the framework of its Regional Seas Programme. As the result of this natural progression, outputs become less oriented to United Nations intergovernmental bodies

^{13/} For the study, a draft of which was submitted to the IOC Secretariat and other United Nations organizations for critical review, see E/5648, 8 May 1975, Coastal Area Management and Development: Report of the Secretary-General. A summary report on the Expert meeting, at which experts from the Gulf region, the Gulf of Guinea, the Malacca Region and the Southern Caribbean Atlantic region were represented, is annexed to the study.

than to the needs of expert users working within Governments or participating in specialized technical bodies or meetings.

The following is a summary of activities related to coastal area management and development.

a. Coastal Area Management Guidelines

Two studies are under preparation which deal with techniques, methodologies and conditions for coastal area development. The first, which is expected to be published late in 1979, relates the economic issues of coastal management to the general development planning process and provides planners and decision-makers with detailed guidelines for establishing a national programme for coastal management. The second study deals with the legislative and institutional aspects of coastal area management. It sets out the results of a survey of coast-related legislation in forty nations, identifies a number of specific needs in light of the survey, and summarizes critical issues in different countries. This study will be published in 1980.

Preliminary work is presently underway for the preparation of a study on marine resources, energy, and alternative development strategies for island countries. Starting with the premise that small islands may lack the minimum critical mass required to pursue the export-oriented, industrial development strategies encouraged under traditional development models, the study will explore the possibilities of more "inward" looking strategies in relation to the marine resource-related sectors.

With an initial focus on the Caribbean, this work is related to other activities being carried out in that region (see below).

b. Seminars

The Ocean Economics and Technology Office and the German Foundation for International Development convened jointly an Interregional Seminar on Development and Management of Resources of Coastal Areas at Berlin (West), Hamburg, Kiel and Cuxhaven from 31 May to 14 June 1976.

Representatives from some 30 developing countries, assisted by resource specialists from the United Nations system as well as from industry and educational institutions, examined the problems and opportunities associated with coastal resource development and management with a view to developing concrete action proposals that would receive expression in follow-up activities at the national, regional or subregional levels.

The format of the Seminar was structured in such a way as to encourage action-oriented results within an integrated planning framework. Thus, the participants first were exposed to a full week of lectures and discussion, ranging from the need for integrated planning to artificial beaches and coastal mapping from satellite altitudes. They were then organized into concurrent workshops that focused on specific priority themes and problems identified on the basis of presentations of national experience.

The recommendations made at the workshop have been one source of impetus to more specific regional activities that are now being implemented under the Ocean Economics and Technology programme.

c. Regional Activities

Following the convening of a Group of Experts on Coastal Area Development at United Nations Headquarters from 11 to 15 November 1974, regional and subregional activities have been implemented in the four coastal regions initially selected for special attention.

(i) The Caribbean

Caribbean Development and Co-operation Committee (CDCC)

At its first session, held from 31 October to 4 November 1975, the CDCC of the Economic Commission for Latin America adopted a work programme that included a section on coastal area development. In response to this expression of interest by Governments in the Caribbean subregion, which took full account of the recommendation of the Group of Experts on Coastal Area Development concerning the region, the Ocean Economics and Technology Office, initially in conjunction with a parallel undertaking by UNEP, prepared a draft background study entitled "Development and environment in the Caribbean: coastal and marine aspects", in consultation with the United Nations organizations and agencies concerned. The study was intended to provide a comprehensive review of the current situation in the Caribbean with respect to marine

resource development and potential, uses of coastal and marine space and the state of the marine environment. A considerably abridged version of the lengthy study was subsequently prepared in order to facilitate deliberations at an Interagency Meeting on Co-ordination for Implementation of the Work Programme of CDCC, convened at United Nations Headquarters from 28 to 30 June 1976.

The Department of Economic and Social Affairs was also represented at the second session of CDCC, held at Santo Domingo in March 1977, when specific needs and problems related to coastal area development to which the United Nations could respond were identified. At its third session in Belize in April 1979, CDCC was informed of the intention of the United Nations Secretariat to formulate a number of specific proposals in the marine sector, for consideration and action by CDCC at its fourth session. Accordingly the Ocean Economics and Technology Office prepared a study entitled, Coastal Area Development and Environment in the Caribbean: Coastal and Marine Aspects^{14/} which was submitted to the CDCC at its fourth session in Surinam in March 1979. The study provided a review of the importance of coastal and marine-related activities by sub-regions. It also outlined specific programmes which might be undertaken at the regional, sub-regional and national levels, to promote the development of coastal areas and marine-related activities in the Caribbean. Among

^{14/} Document E/CEPAL/CDCC/52/Add.1, 19 March 1979.

the sectors or problems covered were: training, research and supporting services; protection from natural hazards; marine pollution; marine transport; fisheries; and tourism. The CDCC agreed to the proposals made.^{15/}

IOCARIBE

A variant of the initial study prepared by the Ocean Economics and Technology Office for the CDCC was submitted to the first session of the Intergovernmental Oceanographic Commission's Association for the Caribbean and adjacent regions (IOCARIBE), which was held in Caracas from 19 to 23 July 1976. IOCARIBE, the successor body in the region to the IOC Co-operative Investigation of the Caribbean and Adjacent Regions (CICAR), in its recommendation I-6, took note of the "development programme of the ... Ocean Economics and Technology Office (of the Department of Economic and Social Affairs) in the Caribbean, particularly as it related to training and education, coastal area development and management and the IOCARIBE project on environmental geology and evolution of the continental and insular margins of the Caribbean and Gulf of Mexico area". IOCARIBE further considered it "essential that it work closely with ... the Ocean Economics and Technology Office and UNEP" and requested "the IOCARIBE secretariat to establish open channels of communication particularly with these two bodies ...". In line with this recommendation the Ocean Economics and Technology Office contributed to the IOCARIBE Environmental Geology Workshop convened in January 1978 in Port-of-Spain, Trinidad and Tobago, and has been co-operating closely with the IOCARIBE Secretariat in organizing

^{15/} Document E/CEPAL/CDCC/54/Rev.1, Vol. I, para. 183.

a regional training workshop on coastal area management and development (see "Training" below).

The OETO also participated in the second session of IOCARIBE held in San José, Costa Rica from 7 to 11 August 1978.

SMILES Conference

The United Nations Department of International Economic and Social Affairs, through the OETO, joined UNEP/ECLA/Caribbean Environment Project (CEP), UNESCO, and the United States National Committee for Man and the Biosphere (MAB) in co-sponsoring the Conference on Environment Management and Economic Growth in the Smaller Caribbean Island (SMILES), scheduled to be held in Barbados from 17 to 21 September 1979. The purpose of the Conference was to assist officials from the Smaller Caribbean islands to formulate strategies for dealing with some of their important resource problems and to develop insights into the requirements of planning for the sound future of the islands. The OETO assumed specific responsibility for organizing and conducting one of the main working sessions of the conference on natural resources and strategies for their development.

Action Plan for the Caribbean

At the request of UNEP and within the framework of its Regional Seas Programme, the OETO in 1979 prepared a study on marine and coastal area development in the wider Caribbean. This study, of approximately 100 pages, examines the existing pattern of economic activity in the Caribbean and its effects on the marine environment. The implications of future growth were also examined, and recommendations are made for

action at the national and international levels. To be issued as a joint UN/UNEP/ECLA publication, the study will serve as a major input into an experts meeting to be convened in the region by UNEP in late 1979 or early 1980. Following the pattern established for other regions, the Expert Meeting is one of several steps leading to a plenipotentiary Conference in the region which will adopt an Action Plan.

(ii) The Gulf Region

The Gulf Region was designated as one of four to receive priority examination under the Ocean Economics and Technology coastal area programme. A plan for a multidisciplinary expert mission was designed at the meeting of the Group of Experts on Coastal Area Development. The IOC and other competent agencies and organizations of the United Nations system were consulted and the integrated nature of the project was ensured by their agreement to take part.

In early 1976, United Nations Environment Programme agreed to undertake a major role in project financing. Following briefings at Headquarters and at Geneva in March 1976, the mission spent two months in the region, visiting each of the eight participating countries (Iraq, Iran, Kuwait, Saudi Arabia, Bahrain, United Arab Emirates, Qatar and Oman).

The working papers, prepared by the team, were compiled and edited by the project manager and circulated to agencies for comment in June 1976. A summary report of the working papers, incorporating agency comments and suggestions, was prepared by the project manager and UNEP in August 1976, and together with a draft action plan, was submitted to an expert meeting on coastal area development and protection of the marine environment jointly sponsored by the Department of Economic and Social Affairs of the United Nations Secretariat and UNEP, and held in Kuwait from 6 to 9 December 1976.

The Ocean Economics and Technology Office was represented at a further expert meeting in Nairobi in 1977, and it participated in the Kuwait Regional Conference of Plenipotentiaries on the Protection and Development of the Marine Environment and the Coastal Areas held in April 1978 at which an Action Plan for the Region was adopted, as were a Convention for Co-operation on the Protection of the Marine Environment from Pollution and a Protocol concerning Regional Co-operation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency. In follow-up to the conference, the Ocean Economics and Technology Office is preparing operational plans for the projects under the Action Plan for which it has been assigned a lead agency role. These projects, all of which require inputs from other United Nations organizations, pertain to: the assessment of geologic processes contributing to, or modifying the fate of pollutants in the region, and their impact on human health, marine eco-systems and human activities, as well as of effects of coastal engineering and mining; survey and identification of major development activities and trends of their future development; co-ordination of marine and land transport activities and the creation of a regional planning and co-ordination programme with special emphasis on port-generated pollution; and the development of principles and guidelines for coastal area development and management through workshops.

The project scenarios will be submitted for approval to a meeting of Government-nominated experts to be held in the region in the latter part of 1979, after which implementation will begin.

(iii) South-East Asia

As in the case of activities in the two regions as described above, the 1974 Group of Experts Meeting on Coastal Area Development provided a spring board for a parallel approach in Southeast Asia. By mid-1979, preparations were in an advanced stage for convening in December 1979 in Manila a Workshop on Coastal Area Development and Management. Contributions to the Workshop are being provided to ESCAP by the OETO with support from the German Foundation for International Development, the East-West Center in Hawaii, UNEP, and the Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP). The participating countries will include the members of CCOP (10 countries) as well as those of the Committee for Co-ordination of Joint Prospecting for Mineral Resources in South Pacific Offshore Areas (CCOP/SOPAC) (7 countries). During the Workshop, United Nations experts and consultants in certain specialities will assist the national participants in examining data collection and analysis techniques, planning methodologies, research programmes design, and administrative regulation procedures. The 10-day workshop is expected to include a field trip of two days.

(iv) West Africa

As a follow-up to the meeting of the Group of Experts on Coastal Area Development, the Ocean Economics and Technology Office prepared a paper entitled "Preliminary study on the major uses of the coastal area, Gulf of Guinea: A proposal for a regional coastal area development scheme", which was transmitted to UNDP and the Economic Commission for Africa (ECA) for comment at the end of 1975. This study was among the sources of information considered by a UNEP Exploratory Mission on Marine Pollution Problems of the West African Coastal States of the Gulf of Guinea, 25 April - 2 July 1976.

The Office subsequently was represented at and contributed to an IOC/FAO/WHO/UNEP International Workshop on Marine Pollution in the Gulf of Guinea and Adjacent Areas, held in Abidjan, Ivory Coast, from 2 to 9 May 1978. This Workshop was one of several preparatory activities undertaken to provide the basis for an Action Plan for the region.

Then in 1979 at the request of UNEP, the Office prepared a background study on socio-economic activities in the region relevant to the marine environment which will be used in the preparation of the draft Action Plan. The draft will be reviewed and revised at a meeting of government-nominated experts which UNEP plans to convene in October 1979.

The Ocean Economics and Technology Office is also responsible for the preparation and management of a regional seminar/workshop on coastal area development in West Africa to be convened in March 1980. The workshop is expected to contribute to meeting extensive training needs

that have been identified in earlier preparatory work as a priority for the region. It should not only enable decision-makers to appreciate more fully the integrated and comprehensive planning principles to be embodied in the action plan for the region, but should also highlight problems of regional concern and those commonly faced by the West African Coastal States. In the short-term, the Workshop will reinforce UNEP's preparatory effort aimed at the adoption of a regional action plan and, in the long-term, facilitate the implementation of the action plan at the national level.

Coastal Erosion Workshop

From 29 January to 9 February 1979, the Ocean Economics and Technology Office with Unesco assisted the United Nations Department of Technical Co-operation for Development to convene a Workshop on Causes of and Possible Solutions to the Coastal Erosion Problems in Togo and Benin. Its objectives were to evaluate existing cases of erosion in Benin and Togo, to identify the causes and possible solutions, and to advise the Governments as to future actions which they might wish to take. Nine national representatives of Benin, 24 of Togo, and nine international experts with divergent backgrounds and experience took part in the Workshop which included several days of field surveys. **The results of the Workshop will be published early in 1980.**

d. Training

In response to concern expressed by the Economic and Social Council, the OETO has considerably expanded its support for and involvement in training activities in marine and coastal affairs over the past several years.

A first step in this direction was the publication late in 1976 of a Register of Courses and Training Programmes in Marine Affairs.^{16/} Prepared by the Ocean Economics and Technology Office with the collaboration of the Intergovernmental Oceanographic Commission (IOC), the Register is intended to inform interested persons, within and outside the United Nations system, of the number, diversity and content of courses and programmes offered by institutions throughout the world in marine related fields. It is hoped that the Register will help the developing countries, in particular, in their efforts to develop an infrastructure of trained manpower in the marine sector and will thereby contribute to the development of national marine capabilities.

As an ICSPRO Agency, the United Nations has increasingly relied upon the TMA component of the IOC, through its Working Committee, as the main mechanism for organizing training activities in the field of coastal area management and development. In this connexion, the OETO followed closely the several regional ad hoc TEMA meetings convened by the IOC Secretariat in 1975-1977 and was able to participate in

^{16/} United Nations publication, Sales No. E.77.II.A.2.

the third such meeting in Manila in September 1975. The interest shown at several of the meetings by participating Governments encouraged United Nations efforts in this field. The OETO also played an active role at the second session of the IOC Working Committee for TEMA, which was hosted by the United Nations in New York in July 1977.^{17/} Recommendation TEMA-II.13, "Coastal Zone Management and Marine Pollution", adopted at that session recommended, inter alia, that "the IOC in conjunction with the ICSPRO agencies take the necessary steps to implement training courses on Coastal Area Management and Development ..."^{18/} At its tenth session, the IOC Assembly provided further impetus to this initiative.^{19/}

In follow-up, IOCARIBE assisted by the OETO, in co-operation with the Government of Mexico, and with the support of the IOC Secretariat and the Division of Marine Science of Unesco and UNEP and the United Nations University, organized a training Workshop on Coastal Area Management in the Caribbean Region. With the receipt of a formal host invitation from the Government of Mexico and the determination of dates suitable to all parties concerned, the Workshop is scheduled to convene from 24 September to 5 October 1979 in Mexico City.

The purpose of the Workshop is to familiarize selected government officials having high level policy-making and planning responsibilities, with the concept of coastal area development within the programme of

^{17/} The UN/OETO substantive contribution is contained in the Report of the ICSPRO Agencies to the Working Committee, document IOC/TEMA-II/8, 13 June 1977.

^{18/} Summary Report, document IOC/TEMA-II/3, 18 August 1977.

^{19/} See Resolution X-18 "Financing 1977 TEMA Activities" and X-19 "The Working Committee for TEMA".

national development planning and to introduce them to the pre-requisites of a management approach to coastal area development. It is expected that approximately 50 participants will attend the Workshop including two participants from each of 17 Caribbean countries, expert lecturers, observers from other countries and organizations, and Secretariat staff.

In addition to the above workshop, the Ocean Economics and Technology Office, at the request of the Government of Guatemala, has begun preparations for a national workshop on coastal area management and development in that country.

e. Marine Affairs Institute

The OETO also continues to provide substantive support for the Institute for Marine Affairs in Trinidad and Tobago. The Institute, which was formally inaugurated in 1975, has among other activities developed and is now implementing a work programme for coastal zone management under the supervision of the United Nations-nominated Acting Director of the Institute. In view of the fact that the IOCARIBE Secretariat was also located in Trinidad and Tobago during the first years of its existence, close co-operative relations between it and the Institute for Marine Affairs were developed and now continue.

4. Marine and Coastal Technology

The objective of activities in this field is to assist developing countries in identifying and evaluating specific marine and coastal technologies most appropriate to their needs and in strengthening their capabilities, individually and collectively, for developing or acquiring, adapting and applying such technologies.

The problems addressed through programme activities include: neglect or inadequate treatment of certain types of coast-related problems, such as erosion, pollution and the destruction of natural resource endowment (for example, mangrove swamps); the failure to exploit or, through the application of inappropriate technologies, the inefficient exploitation of coastal area resources (in terms of cost and productivity, external diseconomies and failure to take full advantage of local resources - labour and materials). Within the wide range of secondary problems that give rise to the above situation, for example, shortage of capital and expertise, and obstacles to the transfer of technology, specific attention is directed to the following:

- (i) Insufficient appreciation of the need for, and of the range of technological alternatives available for, meeting identified problems with specific and appropriate marine technologies. This situation is in large measure attributable to a lack or shortage of information and knowledge of the types and characteristics of marine and coastal tech-

nologies available on a global basis. In this connexion, there is insufficient knowledge concerning alternative suppliers of given technologies and the economic and technical criteria for making a selection among suppliers;

- (ii) Too great a reliance among developing countries in meeting their identified technology needs on suppliers from developed countries and an insufficient degree of technical co-operation among developing countries for sharing resources, experience and expertise.

Because of the diversity of existing United Nations system activities dealing with coastal and marine technology, programme activities in this area have not been designed as a major new endeavour. Rather, a more modest approach has been followed which emphasizes more effective communication and co-ordination among programmes and activities and a pooling of efforts. To this end, activities are carried out under two broad headings: Marine and Coastal Technology Information Service (MACTIS) and Marine and Coastal Technology Application and Adaptation.

Under the first, the United Nations, Department of International Economic and Social Affairs, through the Ocean Economics and Technology Office, in January 1978 joined the FAO and the IOC as a co-sponsor of the Aquatic Sciences and Fisheries Information System (ASFIS). Subsequently the scope of one of the information modules of

ASFIS, namely the Aquatic Sciences and Fisheries Abstracts (ASFA), was broadened to include ocean technology, policy, and non-living resources (ASFA-II), in addition to biological sciences and living resources (ASFA-I). As an input centre for ASFA-II, the United Nations Ocean Economics and Technology Office abstracts and indexes relevant articles from some 40 periodicals as its monthly contribution to the publication, which is disseminated to some 800 institutions catering to primary users around the world.

Also under MACTIS, a guide to sources of information and assistance in marine and coastal technology, (publications, fellowships, training, finance, equipment) within the United Nations system is under preparation in close co-operation with the IOC and other concerned United Nations organizations and is scheduled for publication toward the end of 1979. By providing a central source of information that is presently widely dispersed, this guide is intended to facilitate access by developing countries to the resources, expertise, information and services available within the United Nations System. During the 1980-1981 period, a second guide will be published, to sources of assistance and information outside the United Nations system, primarily industry and government sources.

Under the heading of 'marine and coastal technology application and adaptation', a series of "technology reviews" is planned, each review dealing with a specific marine and coastal activity or problem. Each will provide a state-of-the-art analysis of the techniques/technologies available to deal with the given problem on activity,

and compare costs of alternatives with a view to pin-pointing the technical feasibility of the substitution of low-cost factors for high-cost ones. The objective in each case will be to identify the technologies that may be considered appropriate for developing countries on the basis of their factor mixes. Information will be provided on alternative suppliers and on criteria for selection. Two reviews will be published in 1979 on the subjects of 'coastal erosion control' and 'coastal resources inventory' and others are planned for the 1980-1981 biennium.

In order to encourage co-operation among developing countries in the marine and coastal technology field, a survey is planned of the capabilities of developing countries - that is, present technology applications; activities and programmes of governments, universities and commercial organizations; consultant/expert resources; and physical facilities. The results of the survey will be published in the form of a directory in 1981.

III CONCLUSIONS

The purpose of the foregoing has been to provide an overview of the United Nations programme in the field of ocean economics and technology, both the context in which it developed and ongoing and planned activities.

This overview indicates that in many instances the interaction between United Nations activities in marine affairs and those of the IOC has taken the form of direct collaboration. The Ocean Economics and Technology Office has relied upon the expertise of the IOC, as well as of the Unesco Division of Marine Sciences, for a scientific input to those activities that draw upon marine science disciplines. This has been the case, for example, in the preparation of reports on uses of the sea and in implementing various activities related to coastal area management and development in which the science component is basic and indispensable to development concerns. With the application in recently initiated programme activities of an integrated management approach to extended marine jurisdictions, close collaboration with the IOC will continue to be an essential condition of effective programme implementation. Similarly, the involvement of the IOC will be required across the range of activities in marine and coastal technology.

In the field of ocean energy, in which the Ocean Economics and Technology Office recently commenced a programme of activities that is expected to expand in the coming years, the scope for collaboration with the IOC is potentially great should the Commission undertake an increased involvement in this field.^{20/}

^{20/} A paper entitled On-going and Possible Future Programmes for the Co-ordination of Ocean Energy Activities (IOC/WG-FUROF-II/19, 18 December 1978) was submitted to the Working Group on the Future Role and Functions of the Commission at its second session, 14-20 December 1978.

Even in the field of sea-bed minerals, where the United Nations at Headquarters has a special mandate and competence, IOC activities directed to improving understanding of the geology and geophysics of the ocean floor will assist in the identification, assessment and exploitation of sea-bed resource and thus will indirectly be supportive of ocean economics and technology activities in the field of sea-bed minerals. In addition, as suggested early, the UN/OETO has increasingly turned to the IOC as a joint specialized mechanism for the ICSPRO agencies in the organization of regional training courses/workshops in coastal area management and development. This trend, which was first evidenced in the Ocean Economics and Technology Office contribution to the second session of the Working Committee for TEMA in 1976, was affirmed in a communication of 12 October 1978 from the Head of the OETO to the Chairman of IOC.^{21/}

Future Role and Functions of the Commission

The General Assembly of the United Nations has in effect recognized the role of the IOC as the focal point for marine science within the UN system. It also commended the close working relationships that developed between the IOC, the UN, FAO, WMO and IMCO, including the establishment of ICSPRO, and requested the IOC and the ICSPRO Agencies "to continue to work closely together for the furtherance of their common objectives..."^{22/} It is clearly

^{21/} As reproduced in document IOC/WG-FUROF-II/5, 11 November 1978, Responses from the ICSPRO Agencies to a Request from the Chairman to Prepare a List of Type Species of Activities that Might be Expected of the Commission as a "Joint Specialized Mechanism" for the ICSPRO Agencies.

^{22/} General Assembly Resolution 2560 (XXIV), 13 December 1969. In this resolution, the General Assembly noted with appreciation "the comprehensive outline of the scope of a long-term and expanded programme of oceanic exploration and research, of which the international decade of ocean exploration will be an important element, forwarded by the Chairman of the Intergovernmental Oceanographic Commission of UNESCO..."

in the interest of the UN therefore, and the other United organization, in furthering their common objectives in the marine field that a focal point capability within the system in marine science be maintained and, as required, strengthened. The various resolutions adopted by the IOC Assembly at its tenth session pertaining to this subject recognize the basic concern and the integral role of the ICSPRO Agencies in addressing questions relating to the future role and functions of the Commission.^{23/}

The United Nations/DIESA, through the OETO, closely followed the progress of the Working Group on the Future Role and Functions of the Commission established by the IOC Assembly. In May 1978, the Chairman of IOC met with the Under-Secretary-General for International Economic and Social Affairs of the United Nations on this subject and the views of the latter, affirming United Nations support for, and co-operation in the exercise, together with the views of the Executive Heads of other ICSPRO agencies, were transmitted to the Working Group at its first session in June 1978.^{24/} The Ocean Economics and Technology Office took part in the second session of the Working Group in December 1978 and in the eleventh session of the Executive Council at which the Working Group's report was considered. Indeed, it was as the Executive Council recognized, because several courses of action regarding the future role and functions of the Commission involved the establishment of closer links with, inter alia, the United Nations and its Ocean Economics and Technology Office, that the present report was requested.

^{23/} Resolutions X-25 "The Future Role and Functions of the Commission"; X-26 "Future Development and Improvement in the Status and Working Methods, of the Commission"; X-27 "Programme Forecast 1981/1982".

^{24/} Summary Report, Document IOC/WG-FUROF-I/3, 25 July 1978.

It is evident that the activities of the United Nations in ocean economics and technology are complementary to those of the IOC in marine science. In view of this and of the close co-operative arrangements established under the ICSPRO agreement, the United Nations Department of International Economic and Social Affairs may be relied upon as an active and constructive partner in assisting the IOC to strengthen its capacity to serve the needs of the international community in marine science.