

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION  
(of Unesco)

MARINE SCIENTIFIC RESEARCH, AND DEVELOPMENT AND TRANSFER  
OF MARINE TECHNOLOGY, UNDER THE UN CONVENTION ON THE LAW OF THE SEA  
AND THE NEW OCEAN REGIME: GENERAL IMPLICATIONS FOR  
INTERNATIONAL CO-OPERATION AND THE ROLE OF IOC

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## INTRODUCTION

This paper attempts to provide an overview of certain aspects of the regimes for marine scientific research and for the development and transfer of marine technology, as contained in the Convention on the Law of the Sea (Parts XIII, XIV) from the point of view of their relevance to the pursuit of the objective of strengthening national scientific and technological capabilities. Reference will also be made in the same perspective to provisions that deal with the above-mentioned issues in connection with the regime for the seabed Area (Part XI). <sup>1/</sup>

Attention will also be paid to the role which, in accordance with the Convention, is to be played by competent international organizations, and among them particularly by the Intergovernmental Oceanographic Commission (IOC), in the promotion of the aforementioned objective.

The fundamental role of science and technology in the economic and social development of all countries is a basic assumption underlying economic negotiations within the United Nations for the reshaping of economic relations worldwide. At the United Nations Conference on the Law of the Sea, as part of such international efforts, it was recognized that marine scientific research and development and transfer of marine technology are essential conditions for the effective exercise of the rights and the fulfilment of the responsibilities assigned to States under the Convention and, ultimately, for their taking advantage of the new opportunities for economic and social development arising therefrom.<sup>2/</sup> This led to inserting special provisions in the Convention, dealing with such issues.

In this connection, it should be recalled that participation in marine scientific research and technological development activities cannot be seen independently from the promotion and reinforcement of national scientific and technological capabilities. In fact, these are interdependent aspects. Promoting marine science and technology should not simply imply the facilitation of access of all countries to scientific and technological knowledge produced abroad, but also support the building up and development of national capabilities which might enable States to participate, directly and

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<sup>1/</sup>The Convention, signed in December 1982, is not in force yet. In any case, its provisions offer the foundation on which any appreciation of the future behaviour of States and their mutual relations in ocean affairs should be undertaken.

<sup>2/</sup>The Preamble recognizes the desirability of establishing through the Convention "a legal order for the seas and oceans which would facilitate international communication and promote their peaceful uses, the equitable and efficient utilization of their resources, the conservation of their living resources, the study, protection and preservation of the marine environment", and considers that "the achievement of these goals will contribute to the realization of a just and equitable international economic order which takes into account the interests and needs of developing countries, whether coastal or land-locked..."

autonomously, in the universal process of marine science and technology production and use.<sup>1/</sup>

The Convention defines a juridical framework for the creation of conditions for all States to participate fully in marine scientific research and have access to available technological knowledge and technology. The new opportunities translate into rights (and arise indirectly from the duties) assigned to States by the Convention. Particularly relevant in this regard are duties of States to co-operate with each other. It should be noted at the outset that such rights and duties are to a certain extent made dependent upon the relative levels of economic and social development of States and upon the inherent scientific and technological capabilities.

International organizations appear, together with direct bilateral and multilateral relations among States, as frameworks for the latter to cope with their duties to co-operate in marine scientific research and in the transfer of marine technology. The quantitative and qualitative significance of references to international organizations throughout the provisions dealing with these subjects is symptomatic of the role they are expected to play in the pursuit of the objectives of the Convention.

The IOC is the leading body within the United Nations system with competence in marine scientific research and related transfer of marine technology and training and education. It is therefore understood that it carries out its programmes and activities in the exercise of its functions in accordance with its Statutes. There is no doubt, however, as to the impact on the IOC of the new ocean regime and of demands for co-operation arising therefrom.

Our endeavour in this paper will be to review such impact generally, as presently or potentially perceived, taking into consideration, in particular, the Commission's present structure and activities, as well as perceptible trends influenced by the new circumstances. Special attention will be given to IOC's responsibilities for strengthening the scientific and technological capabilities of its Member States.

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<sup>1/</sup> This should be understood broadly as comprising the capacity of States to plan, to budget, to manage, to co-ordinate, to stimulate, to promote and to execute scientific and technological activities relevant to certain objectives of development, as well as their capacity to evaluate, to select, to acquire and to adapt foreign technology and expertise (The Vienna Programme of Action on Science and Technology for Development, United Nations, New York, 1979, p.5).

## THE REGIME OF MARINE SCIENTIFIC RESEARCH

The most relevant feature of the new regime of marine scientific research is the jurisdiction of coastal States over such activity in their respective exclusive economic zones and on their respective continental shelf (Art. 56). This jurisdiction implies the right of coastal States to authorize, regulate and conduct marine scientific research activities (Art. 246). Their consent is required for the conduct of marine scientific research in those spaces by other States or by international organizations.

The jurisdiction could be understood as being instrumental in maintaining the sovereign rights of the coastal States in the exploration, exploitation, conservation and management of marine resources (Art. 56). In other words, it is the legal condition for acquiring the scientific basis necessary for the fulfilment of such functions.

However, the Convention sought to reconcile the interests of coastal States with those of researching States (that is, States intending to conduct marine scientific research in areas under the national jurisdiction of other States or in the high seas), as well as of the international community as a whole, in the interest of scientific progress. In this light, the Convention expressly stipulates the duty of all States to promote international co-operation in marine scientific research (Art. 242). In general, the achievement of this is sought through bilateral and multilateral agreements (Art. 243), as well as through the publication and dissemination of information and knowledge resulting from marine scientific research (Art. 244).

The concern for creating favourable conditions for co-operation in marine scientific research in areas under their jurisdiction, explains the duty incumbent upon coastal States to give their consent, in normal circumstances, to projects by other States or competent international organizations to be carried out in accordance with the Convention (Art. 246 §3).

Although all States are assigned rights in the field of marine scientific research in the exclusive economic zone and on the continental shelf, the question arises as to whether some coastal States, particularly developing ones, have the necessary capabilities - involving human, financial and technical aspects - for exercising such rights effectively.

In fact, existing disparities in the levels of scientific and technological development of States make international co-operation desirable not only for expanding the opportunities for developing countries to participate in marine research and have access to its results, but also for strengthening their national research capabilities through training and education of their scientific and technical personnel.

This is why, on the one hand, under the consent regime specified in Arts. 248 and 249 of the Convention, the coastal State is allowed to take advantage of research conducted by foreigners in areas under its national jurisdiction through the requirement that the latter comply with certain conditions, which include admitting direct participation of nationals of the coastal States in the research projects and access to resulting scientific and technological knowledge, and which may also provide opportunities for training and education of nationals of the coastal State.

With that in view, it is stipulated, in a more precise manner, that States or competent international organizations that intend to undertake scientific research in areas under national jurisdiction shall provide the coastal State with a full description of the project, including reference to the extent to which it is considered that the coastal State should be able to participate or to be represented in the project (Art. 248 (f)). Moreover, when undertaking marine scientific research in the exclusive economic zone or on the continental shelf of the coastal State, the researching State or organization shall: (a) ensure the right of the coastal State, if it so desires, to participate or to be represented in the project, especially on board research vessels and other craft or scientific research installations, when practicable, without payment of any remuneration to the scientists of the coastal State and without obligation to contribute towards the costs of the project; (b) provide the coastal State, at its request, with preliminary reports as soon as practicable, and with the final results and conclusions after the completion of the research; (c) undertake to provide access for the coastal State, at its request, to all data and samples derived from the marine scientific research project and likewise to furnish it with data which may be copied, and samples which may be divided without detriment to their scientific value; (d) if requested, provide the coastal State with an assessment of such data, samples and research results or provide assistance in their assessment or interpretation (Art. 249 §1).

On the other hand, States also have the duty to actively promote, directly or through international organizations, the flow of scientific data and information and the transfer of knowledge. Though showing itself as a duty of all States (Art. 244 §1), specific reference is made as well to programmes to provide adequate education and training of technical and scientific personnel of developing countries in order to strengthen their national scientific research capabilities (Art. 244 §2).

The two directions of international co-operation as described above are also apparent in connection with the role foreseen for international organizations in marine scientific research.

According to the Convention, international organizations are mechanisms to facilitate concertation and agreements providing for the conduct of scientific research in enlarged areas of national jurisdiction - between coastal and researching States - and in the high seas, as well as to promote and facilitate the reinforcement of scientific and technological capabilities of countries in need.

Although, presumably, the first goal is to be pursued preferably through direct relations among States in accordance with Arts. 246 to 254, a special function is foreseen in Art. 247 for international organizations in the facilitation of agreement on projects to be undertaken by them or under their auspices in the exclusive economic zone or on the continental shelf. Whenever the coastal State is a member of the organization and has approved the project, the project is considered to have been authorised following mere notification to the coastal State and if this State has not expressed any objection within four months.

THE REGIME OF THE TRANSFER OF MARINE TECHNOLOGY

Part XIV of the Convention specifies, on a general and extensive basis, the legal and institutional conditions for a more balanced access of States to marine science and technology inasmuch as this constitutes a requirement for the exercise of all maritime activities, including marine scientific research itself. The provisions of Parts XIII and XIV are complementary inasmuch as access to appropriate technologies is required for the conduct of marine scientific research.

It should be pointed out in this respect that Part XIV of the Convention covers not only the transfer but also the development of technology. What is envisaged is not only that developing countries may obtain the technologies necessary for them to carry out maritime activities in appropriate conditions, but that they build up their national scientific and technological capabilities. In fact, effective development and transfer of marine technology presuppose that certain conditions are met from the point of view of the terms and conditions of the transactions of technology, as well as from that of the capabilities of recipient countries. The Convention shows an awareness of both these aspects.

With respect to the former, the Convention prescribes, inter alia, the duty of States "to endeavour to foster favourable economic and legal conditions for the transfer of marine technology for the benefit of all parties concerned on an equitable basis" (Art. 266 §3) and, more specifically, "to endeavour to promote favourable conditions for the conclusion of agreements, contracts and other similar arrangements under equitable and reasonable conditions" (Art. 269(b)).

Such provisions should be viewed in the light of international instruments that deal in general with transfer of technology, which have been adopted or are still being negotiated in other United Nations fora; namely, the UN Conference on Science and Technology for Development and the UN Conference on Trade and Development. In fact, the Convention on the Law of the Sea does not enter into details concerning certain issues covered by such general instruments, as the precise scope of national regulations on the transfer of technology, restrictive business practices, guarantees of holders or suppliers of technology. Nevertheless, attention should be called to Art. 271 stipulating that States "shall promote the establishment of generally accepted guidelines, criteria and standards for the transfer of technology on a bilateral basis or within the framework of international organizations and other fora, taking into account in particular the interests of developing States". For implementing this Article, special agreements could be envisaged which would complement those that deal with the transfer of technology in general.

Under these Articles, it is sought that States take measures at the international level for creating a legal and administrative environment conducive to facilitating the flow of technologies. The reference to economic conditions that States should foster could be understood as implying not only the adoption of incentives for the stimulation of positive action of private and public enterprises to enter into more equitable contracts with foreign entities than has been the case hitherto in the free market, but also that States themselves co-operate in the establishment or strengthening

of infrastructures, as required, for enabling recipient countries to attain the level of capabilities necessary for them to choose and adapt imported technology and, ultimately, to innovate.

Nevertheless, industrialized States, where most of the producers and exporters of technology are to be found, are eager in their demands for legal protection of producers and holders of technology.

This is reflected in the mostly vague formulations that the representatives of such States tend to favour when the drafting of juridical international instruments is at stake.

This also explains the fact that Art. 267, for instance, explicitly safeguards the "legitimate interests" in this field, meaning the rights of holders and suppliers of technology.

In view of what has been said, it is not expected that the implementation of the Convention is going to bring about any relevant change in the present patterns of commercial relations between holders and buyers of marine technology.

This being so, the role of international co-operation, directly among States or within international organizations, becomes even more critical for the creation of opportunities for developing countries to further their capabilities in marine technology.

In addition to the asserted global objective of promoting the flow of technology, the Convention pays regard to the special needs of developing countries to have access to technology and to build up their capabilities which may be instrumental in the development of technology.

The basic objectives and the measures to achieve such objectives in this respect are made explicit by the Convention in Articles 268 and 269.

Art. 268 puts emphasis on access to marine technological knowledge and information and data and on its requirements - the establishment of the infrastructure to facilitate the transfer and the human resource base.

Special reference is made to developing countries in connection with the stated objective of developing human resources through training and education.

Art. 269 refers in a non-exhaustive manner to different kinds of action (programmes of technical co-operation: agreements, contracts and similar arrangements; conferences, seminars and symposia; exchange of scientists and of technological and other experts; projects and joint ventures) through which the said objectives could be achieved.

When referring to technical co-operation programmes for the transfer of all kinds of marine technology, preference is also accorded to developing States in the establishment or development of their own technological capacities in marine science and in the exploration and exploitation of marine resources or the development of the infrastructures of such technology.<sup>1/</sup>

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<sup>1/</sup> One could note, however, that the current reference to "developing countries" as the preferential beneficiaries of technical assistance is replaced in Part XIV by that of a somewhat different category of States, those which "may need and request technical assistance".

So, while mostly recognizing existing practice in international co-operation (though reinforcing its juridical basis by making rights and duties in these fields more reliable), the Convention provides for new roles for international organizations as well, which may imply adjustments in the terms of reference of the organizations concerned, if they are to become more effective.

Of much interest and relevance in this connection are the provisions on "National and Regional Marine Scientific and Technological Centres" (Section 3 of Part XIV). These are considered to be basic institutional infrastructures for the development of local capabilities. International organizations are expected to play a decisive role in the establishment or strengthening of such Centres.

National Centres are intended to stimulate and advance the conduct of marine scientific research by developing coastal States and to enhance their national capabilities to utilize and preserve their marine resources for their economic benefit. With that in view, States, through competent international organizations and the Authority, are enjoined to give adequate support to facilitating the establishment and strengthening of such National Centres so as to provide for advanced training facilities and necessary equipment, skills and know-how, as well as technical experts to such States which may need and request such assistance (Art. 275).

The establishment of Regional Centres is also foreseen which should maintain adequate links with National Centres and be assigned special tasks for the stimulation and advancement of the conduct of marine scientific research by developing States and the fostering of the transfer of marine technology. An obligation of all States of a region to co-operate with the regional centres is also stipulated (Art. 276).

The multidisciplinary scope of such bodies is apparent from the relevant provisions, particularly from the listing of the functions of regional centres. Among these one could note the reference to "programmes at all levels on various aspects of marine scientific and technological research, particularly marine biology, including conservation and management of living resources, oceanography, hydrography, engineering, geological exploration of the sea-bed, mining and desalination technologies" (a), as well as to "acquisition and processing of marine scientific and technological data and information" (e), or "compilation and systematization of information on the marketing of technology and contracts, and other arrangements concerning patents" (h).

Therefore, National and Regional Centres are considered to be important instruments for the attainment, inter alia, of basic objectives in the field of transfer of marine science and technology as specified in Article 268 (as "the development of the necessary technological infrastructure to facilitate the transfer of marine technology" or "the development of human resources through training and education of nationals of developing countries").

One could note in addition the assertion, in the Resolution on "Development of National Marine Science, Technology and Ocean Service Infrastructures"<sup>1/</sup> that "national and regional marine scientific and technological centres would

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<sup>1/</sup> Annex VI to the Final Act of the Third United Nations Conference on the Law of the Sea. In: The Law of the Sea, Official Text of the United Nations Convention on the Law of the Sea with Annex and Index, United Nations, New York, 1983, pp. 185-186.



be the principle institutions through which States, and, in particular, the developing countries, foster and conduct marine scientific research and receive and disseminate marine technology". The Resolution recognizes further the "special role of the competent international organizations envisaged by the Convention on the Law of the Sea especially in relation to the establishment and development of national and regional marine scientific and technological centres".

This Resolution is also relevant in that it clarifies the duties of the different actors in this field by pointing to specific responsibilities incumbent upon States and international organizations.

As pointed out above, the responsibilities arising from the new ocean regime for States are, to a certain extent, made dependent upon their relative differences in the development stage. In this light, the Resolution distinguishes States in general from developing countries and industrialized countries. The former are, *inter alia*, called upon to determine appropriate priorities in their development plans for the strengthening of their marine science technology and ocean services. Developing countries are, on their part, called upon to establish programmes for the promotion of technical co-operation among themselves in the field of marine science, technology and ocean services development programmes.

Funding agencies (namely, the World Bank, regional banks, UNDP, the United Nations Financing System of Science and Technology for Development) are requested to augment and co-ordinate their activities in the provision of funds to developing countries, while competent international organizations in the United Nations system are called upon "to expand programmes within their respective fields of competence for assistance to developing countries in these fields and to co-ordinate their efforts on a system-wide basis in the implementation of such programmes paying particular attention to the special needs of the developing countries".

The Resolution explicitly confirms that "optimum utilization of the new opportunities for social and economic development offered by the new regime will be facilitated through action at the national and international levels aimed at strengthening national capabilities in developing countries with a view to ensuring the rapid absorption and efficient application of technological and scientific knowledge available to them, including the rapid advances being made in the field of marine science and technology that developing countries should be enabled to share".

#### THE REGIME OF SCIENTIFIC RESEARCH AND OF THE TRANSFER OF TECHNOLOGY RELATING TO THE SEABED AREA

The regime applicable under the UN Convention to the development and transfer of marine science and technology, as well as to the promotion of scientific and technological capabilities required for exploring and exploiting the mineral resources of the sea-bed area beyond the limits of national jurisdiction, presents some special features. These follow from the legal status of the Area, defined in the Convention as the "common heritage of mankind" (Art. 136), and particularly from the functions assigned to the International Sea-bed Authority, which is the entity to be created for administering the Area (Arts. 137, §2, 153 §1).

The nature of the regime for the Area led to special rights and responsibilities to be assigned to the International Sea-bed Authority. These rights and responsibilities should be viewed in connection with the nature of this organization as administrator and supervisor of activities in the Area, as well as with its functions to be undertaken through the Enterprise (Art. 158, §2; Art. 170; Annex IV). These require that the Authority take measures to acquire appropriate technology and scientific knowledge.

Activities in the Area will be organized, carried out and controlled by the Authority (Art. 157). "Activities in the Area" means, for the purposes of the Convention, "all activities of exploration for, and exploitation of, the resources of the Area (Art. 1)". This excludes marine research not intended to be the basis for exploitation of the resources of the Area, which is to remain free.

But the Authority is also entitled to carry out marine research concerning the Area and its resources, and to enter into contracts for this purpose; it is to promote and encourage the conduct of scientific research, then co-ordinate and disseminate the results of such research and analysis when available (Art. 143 §2). The Authority should, in addition, encourage prospecting of the Area (Annex III, Art. 2 §1 (a)).

Moreover, notwithstanding the principle of the freedom of scientific research in the Area, a general obligation is imposed on parties participating in international programmes (Art. 143 §3) that includes their duty to ensure that programmes are developed through the Authority and other international organizations, that there be provision for dissemination of results and their analysis, and that opportunities be opened for the Authority's and developing countries' personnel to participate in such research and have access to its results.

Access to technologies for exploring and exploiting the sea-bed raises problems of a special nature as well. These technologies are of recent date, coming from a limited number of enterprises in a few highly industrialized countries; some technologies are not yet commercialized. Developing countries feared that, in the absence of compulsory mechanisms applicable to the relations between the Authority and national operators, the Authority would not make the required technology available, thus preventing it from initiating exploitation of the mineral resources of the Area. This concern underlies the inclusion, in the Convention, of provisions that prescribe undertakings by national operators to make available to the Enterprise the technology used when carrying out activities in the Area under contract with the Authority (Art. 5 of Annex III).

Of course, access to scientific and technical knowledge for exploring and exploiting the sea-bed is not a sufficient condition for the Authority to engage in research and exploitation of sea-bed resources, nor in the administration and control of related activities in a rational and effective manner. An essential additional requirement is the availability of manpower with the appropriate scientific, technical and managerial capabilities enabling the Authority not only to understand available scientific data, technologies and other know-how, but to develop technologies further.

Thus, the administrative and operational responsibilities incumbent upon the Authority call for special focus on education and training in deep-sea mineral development. This should also be seen in connection with the Authority's duty to pay due attention to the importance of recruiting its staff on as wide a geographical basis as possible (Art. 167 §2).

Apart from obligations incumbent upon States in the context of contractual relations with the Authority, which include training and transfer of data (Arts. 14 and 15 of Annex III), the Convention establishes a general obligation of States to promote programmes for the transfer of technology to the Enterprise and to developing countries with regard to activities in the Area, as well as measures directed towards the advancement of the technology of the Enterprise and the domestic technology of developing States. This is to be accomplished through providing to personnel from the Enterprise and from developing States opportunities for training in marine science and technology and for their full participation in activities in the Area.

So, in view of the international system based on the concept of the "common heritage of mankind", the pertinent provisions are fundamentally meant to create the scientific and technological conditions for: (i) the Authority to acquire the appropriate capabilities; and (ii) the Enterprise to have access to the required technologies, thus ensuring effective implementation of the objectives of the regime for the Area (Art. 150). But, indirectly, opportunities for helping the building of national scientific and technological capabilities in developing countries relating to activities in the Area may emerge from the Convention as well.

#### THE FUNCTION OF INTERNATIONAL CO-OPERATION AND THE ROLE OF IOC UNDER THE CONVENTION

As noted above, international co-operation is dealt with by the Convention, in connection with, inter alia: the conduct of marine scientific research, the flow of scientific information and data and the transfer of knowledge resulting from marine scientific research (Arts. 245 to 248), the development of marine scientific and technological capacities of developing countries with regard to marine scientific research (Art. 266), and, generally, the development and the transfer of marine science and technology (Arts. 268 and 269).

Most of the objectives and measures pointed out in this respect are not new in international co-operation. The question remains, however: to what extent are the principles and rules of international co-operation in marine scientific research and transfer of marine technology contained in the Convention, and their corollaries (i.e., the duty to co-operate) innovative, and thus may have repercussions on the role of international organizations, including the IOC?

A salient aspect of the Convention is the emphasis placed on the need for the further implementation of the existing bilateral, regional or multi-lateral international co-operative programmes. Provision is made in parallel for expanding and launching new programmes in order to facilitate marine scientific research and the transfer of marine technology, particularly in new fields, and appropriate international funding for ocean research and development (Art. 270).

Another significant feature of the Convention is the weight given to international organizations. They appear, together with direct bilateral and multilateral relations among States, as instruments of co-operation, since they provide the institutional frameworks for States to cope with their duty to co-operate. This is reflected in the language of many articles of the Convention which stipulate the duty of States, "directly among themselves or through international organizations" to co-operate with each other in the pursuit of the goals of the Convention. The Convention shows a shift in emphasis, mainly of a quantitative nature, compared to previous international instruments in the fields of marine scientific research and transfer of marine technology. But apart from responsibilities of international organizations which reflect functions they have been performing (and therefore not substantially innovative), the Convention contemplates some others which are new. Examples of these emerge from provisions dealing with the direct conduct of research by international organizations (Arts. 246 and following), their specific role as brokers between coastal and researching States (Art. 247), and their role in drawing up and maintaining lists of experts in the field of marine scientific research for the purposes of dispute settlement (Annex VIII, Art. 2). Express reference is made in this connection to the Intergovernmental Oceanographic Commission (IOC). New functions may also arise for competent international organizations in marine scientific research concerning the Area and its resources, through co-operation with the Authority (e.g., Art. 144).

As pointed out previously, this paper concentrates on the Intergovernmental Oceanographic Commission (IOC) in view of its competences in the field of marine scientific research and the related technology, ocean services and training, education and mutual assistance.

The IOC is the leading body of the United Nations system in the field of marine science and the related technology. According to its Statutes, the central purpose of the Commission is to "promote scientific investigation with a view to learning more about the nature and resources of the ocean through the concerted action of its members" (Art. 2 of the IOC Statutes).

It was the perception of the need to ensure real partnership among IOC Member States (at present, two thirds of the Commission's Member States are developing countries) that later on led the Commission to pay growing attention to training, education and mutual assistance in the marine sciences.

The IOC Statutes (Article 2) now make reference to, among other functions, the making of recommendations to strengthen education and training programmes in marine science and its technology.

More generally, in carrying out its functions, the Commission should bear in mind the special needs and interests of developing countries, including, in particular, the need to develop the capabilities of these countries in marine science and technology" (Art. 2 (h)).

Therefore, the role of the IOC in training and education and in the transfer of marine technology is directly related to its competences in ocean science, inasmuch as these are instrumental in the conduct of marine scientific research. It further involves responsibilities in the development of the national capabilities of developing countries to enable them to participate as fully as possible in marine scientific research, particularly in IOC co-operative programmes, and to use appropriate technology.

In order to fulfil its tasks in training and education, the IOC Working Committee for Training, Education and Mutual Assistance in the Marine Sciences (TEMA) was established in 1973. It recommends programmes, particularly those relevant to IOC, that call for concerted action by members of the Commission and other participating international organizations, and arranges for the provision of scientific and technological training and the transfer of relevant technology and technical assistance to developing countries in marine science aspects of ocean affairs. This is aimed at building up capabilities of countries to participate fully in ocean research of interest to them, including IOC programmes, and to achieve self-reliance in the marine sciences as a whole. TEMA is today a component of each programme of IOC, whether in the field of ocean sciences or ocean services.

TEMA's basic purpose is to identify the training, education and mutual assistance needs of Member States, particularly developing countries, and endeavour to ensure that these can be met.

According to the IOC Statutes, the Commission also has co-ordination functions with respect to programmes of certain UN organizations with competence for scientific research. This function is carried out through the Inter-Secretariat Committee on Scientific Programmes Relating to Oceanography (ICSPRO). The Commission plans, promotes, and co-ordinates international co-operative marine science, thus complementing the relevant operational functions which are mainly carried out by the UN Specialized Agencies concerned (UN, Unesco, FAO, WMO and IMO).

From a review of the present Terms of Reference of the IOC and its subsidiary bodies, as well as of programmes and projects carried out recently or under way, one could say that the IOC has, in its own field of competence, anticipated the main provisions of the Convention. As the United Nations Conference was giving form and substance to the Convention on the Law of the Sea, a process was launched and developed by the IOC in response to trends already perceptible at the time by its Member States.

This process followed two main directions: on the one hand, in a formal and long-term approach, the Commission engaged itself in a review of its future role and functions. A special Task Team was constituted for that purpose <sup>1/</sup>; on the other hand, the Commission set immediately into motion, in accordance with its Terms of Reference, a number of initiatives, particularly of an institutional character aimed at adjusting to the new demands.

Nevertheless, one should not disregard the fact that the substance of the Convention, as a consequence of the extension of the limits of areas under national jurisdiction, is even now influencing the direction of activities of intergovernmental organizations competent in ocean affairs. Those that appear as features of the institutional process under way within the IOC under the influence of the new regime of marine scientific research and the transfer of its technology are outlined below. Attention will be paid to the following trends;

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<sup>1/</sup> Resolution EC-XIII.16 of the Executive Council at its Thirteenth Session (June 1980) decided to create an ad hoc Task Team to Study the Draft Convention on the Law of the Sea, and Any Future Text Developed by UNCLCS, and the Implications to the Commission.

- (i) strengthening of the means allocated to IOC programmes and activities;
- (ii) emphasis on the need for a scientific basis for management, conservation and exploitation of marine resources, or on the application of the results of marine scientific research;
- (iii) taking a selected ocean region as an appropriate geographical basis for co-operation of States in the field of marine scientific research, ocean services, and the related technology;
- (iv) reinforcing the co-ordination of programmes and activities of competent international organizations;
- (v) responsiveness to the interests and needs of developing countries, and their preferential treatment.

Though various, all these aspects are interrelated and to a certain extent part of the same process. They influence the functioning and the activities of IOC in ocean science and services and the related training, education and mutual assistance.

(i) Strengthening of the means allocated to IOC programmes and activities

Before entering into the mainly qualitative aspects of institutional evolution which concerns us here, one could emphasize the view that the need for assistance arising from the new ocean regime calls for an expansion of the programmes and activities of international organizations. This should, of course, be seen in close connection with measures for developing national capabilities to undertake research, particularly that aimed at increasing the knowledge and understanding of marine resources and the marine environment in maritime zones under national jurisdiction, thus enabling adequate exploitation and economic utilization.

The UNCLOS Resolution on "Development of National Marine Science, Technology and Ocean Service Infrastructures" also stresses, with regard to training, education and assistance in the field of marine science, ocean services and technology the view that "present efforts undertaken within the United Nations are far below current requirements and could be inadequate to meet the demands generated through the operation of the Convention".

The quantitative reinforcement of the means available to the IOC would eventually imply giving priority consideration to marine science within Unesco. Indeed, the Fourteenth Session of the General Conference of Unesco recognized that the importance of the new ocean regime emerging from the decisions of the Third United Nations Conference on the Law of the Sea, its implications for Member States and for the relevant international organizations in regard to opportunities for development, and the responsibilities arising therefrom, make it necessary to extend marine scientific research and international co-operation at national, regional and global levels.

This was the reason underlying its recommendation that "the Director-General give special attention in this transitional phase to the need to strengthen the intergovernmental programme in the marine sciences

and ocean services, in order to assist Member States, in particular developing countries, to cope with the demands placed on them in connection with the new ocean regime emerging from the Third United Nations Conference on the Law of the Sea".<sup>1/</sup>

It further recommended that the Director-General continue to give special support to intergovernmental programmes carried out under the auspices of Unesco for the conservation and development of natural and marine resources and sustain a high proportion of the budget as the allocation to science and technological programmes of the Organization.

Under Major Programme X ("The human environment and terrestrial and marine resources") the Unesco General Conference, at its Fourth Extraordinary Session, deemed necessary the continuation and strengthening of the programmes in the field of marine sciences, particularly those of the IOC, that is, programme X.4 ("The ocean and its resources").<sup>2/</sup>

But apart from a relatively stronger emphasis on marine science and technology within the overall spectrum of Unesco programmes, coping adequately with such needs would presumably have further budgetary and staffing implications for the Commission itself. Part of the answer may also be found in improved co-ordination by IOC of scientific programmes of international organizations concerned (see (iv), below).

(ii) Emphasis on the need for a scientific basis for management, conservation and exploitation of marine resources, or on the application of the results of marine scientific research

The new rights and responsibilities of coastal States in areas under their jurisdiction are functionally oriented. They were conceived as being instrumental in the exploitation of marine resources and the marine environment for economic purposes.

In fact, sound management, conservation and exploitation of marine resources and protection of the marine environment depends upon the availability of an appropriate scientific basis.

The Convention reflects such concern at various times by making explicit, for instance, the relevance of the exchange of scientific information and data and of international co-operation in marine scientific research in connection with certain applied ends such as the conservation of living resources (Art. 61 §5) and the protection of the marine environment (Arts. 200, 201 and 202, dealing, respectively, with: studies, research programmes and exchange of information and data; scientific criteria for regulations; and scientific and technical assistance to developing States).

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<sup>1/</sup> Extracts from Documents, Addresses, Resolutions and other Relevant Information Related to the Marine Sciences, Unesco, IOC, Fourteenth Session of the Executive Council, Tenerife, June 1981. (Document IOC/INF-443)

<sup>2/</sup> Extracts of Recent Decisions and Documents of Unesco Governing Bodies Relevant to the Work of the Commission, Unesco, IOC, Seventeenth Session of the Executive Council, Paris, February 1984 (IOC/INF-550)

The scope of these Articles is that of ensuring, in practice, the linkage of co-operation in marine scientific research, in the exchange of its results and in promoting scientific and technological capabilities, with operational activities.

From the IOC's standpoint this is not a new concern. In fact, the Commission's activities have been guided by considerations of this nature through a progressive orientation of its programmes and activities to specific problems, and the creation of institutional arrangements for promoting more active participation of countries in the identification and solution of problems of interest to them. The role of IOC has indeed been evolving from its original purpose, given in the Statutes, towards an increasing emphasis on developing the scientific basis for enhanced utilization of the ocean and its resources and the development of the related ocean services; starting from purely scientific interests, the Commission has become progressively more concerned with services and the application of scientific results for practical purposes.

For instance, Resolution XI-17 of the Eleventh Assembly recognized the "vital need for adequate understanding of the relationships between ocean environmental variability and fish stocks" as a basis for the IOC activities in ocean science to "enhance and complement the study of living resources".<sup>1/</sup> The same Resolution was instrumental in the Assembly's decision "to undertake the development of plans for a major programme of the IOC on oceanographic studies of the marine ecological conditions in relation to fish stocks".

IOC also contributes to providing the scientific basis for the management and protection of the marine environment, with special emphasis on the marine ecosystem, through the IOC Working Committee for the Global Investigation of Pollution in the Marine Environment (GIPME)<sup>2/</sup>. In this field, as happened with regard to living resources, the IOC was requested to accelerate the implementation of the Comprehensive Plan for the GIPME "to provide continuous scientific and technical guidance on marine pollution monitoring programmes within the Commission to provide a sound basis for the assessment and regulation of marine pollution".<sup>3/</sup>

Confirming the same approach, the IOC Assembly recently adopted two scientific programmes which are included in the Programme and Budget for 1984-85 and are to be carried out in close co-operation with FAO and the United Nations, respectively: Ocean Science in Relation to Living Resources (OSLR), and Ocean Science in Relation to Non-Living Resources (OSNLR).

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<sup>1/</sup> Resolution XI-17, Ocean Sciences in Relation to Living Resources, of the 11th Session of the Assembly, October-November 1979.

<sup>2/</sup> Resolution IX-20 (GIPME) of the Ninth Session of the Assembly, November 1975 (Terms of Reference contained in Annex to Resolution IX-20).

<sup>3/</sup> Resolution XI-5 (GIPME) of the Eleventh Session of the Assembly, October-November 1979.



The Assembly further decided to strengthen the programmes relating to ocean dynamics and the effects on climate, as well as those concerned with the monitoring of marine pollution (MARPOLMON). It also strongly recommended the development of ocean mapping activities and those undertaken by the various ocean services concerning the international exchange of oceanographic data and information. This was done on the assumption that the activities in question have an essential role to play in the transfer of knowledge and technologies relating to the development of marine resources.

(iii) Taking a selected region as an appropriate geographical basis for co-operation of States in the field of marine scientific research and technology

As part of the reorientation of activities of the IOC, their regional implementation is being promoted. One basic reason underlying such a move is the will of Member States to complement the traditional approach to co-operation in marine scientific research by one which would address the more concrete interests and needs of countries, particularly developing ones, relating to marine science and its technology, required for the sound management, conservation and exploitation of marine resources and the protection of marine environment in areas under their jurisdiction or in selected ocean regions. This would simultaneously be conducive to more direct and active involvement of local countries in research activities than has been the case in the past. This assumption has been followed by some steps towards the consolidation of the IOC institutional structure at the regional level.

Since the mid-70s, the IOC had been developing regional co-operative investigations through regional subsidiary bodies established on a short-term and medium-term basis. Examples of these are the IOC Association for the Caribbean and Adjacent Regions (IOCARIBE) and IOC Programme Group for the Western Pacific (WESTPAC).

But the assessment of present realities and the pressures for assistance arising therefrom have led the Commission to undertake the creation of permanent structures for co-operation at the regional level. It was recognized that, in order to service Member States concerned on a scale that maximizes their input to, and benefit from, the global programmes, and to give the regional structures the status needed to fulfil the mandate and meet the new demands placed upon them, the establishment of Sub-commissions would be an appropriate solution.

So at its Twelfth Session, the IOC Assembly adopted the concept of regional Sub-commissions and created the IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE) to replace the experimental Association for this region. Pending further consideration of the application of this concept in other regions, the Programme Groups for the Western Pacific (WESTPAC), for the Co-operative Investigations of the North and Central Western Indian Ocean (IOCINCWIO) and for the Southern Oceans (IOCSOC) have developed specific scientific activities.<sup>1/</sup>

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<sup>1/</sup> Recent Decisions and Activities of the Organizations of the United Nations System of relevance to the work of the Unesco, Unesco Executive Board, 116th Session. 116 Ex/33 (Extracts), Paris, April 1983 (IOC/INF-550), p. 23.

The consolidation of IOC regional subsidiary bodies is then sought to allow systematic participation of countries concerned in such structures and their decisive intervention in the definition of the direction of research towards issues of special concern to the region.

It may be interesting to note that the objectives and functions of the IOC regional sub-commissions are to a certain extent modelled by the contents of provisions of the UN Convention on the Law of the Sea dealing with international co-operation in marine scientific research and the transfer of marine technology. This is so as regards, in particular, Regional and National Research Centres. Provision has been made in the Guidelines for the Structure and Responsibilities of IOC Sub-commissions for the establishment of such institutions by having recourse to language which resembles that of Articles 275 to 277 of the Convention.

One should not, however, neglect the fact that the creation of like institutions finds its roots in the past regional co-operative endeavours of the IOC. In this context, the development and strengthening of Regional and National Centres or Institutes have been considered and put into practice.<sup>1/</sup> One could regard the establishment of an IOC Programme Group for the Central Eastern Atlantic (IOCEA) in the same light.

The fundamental function of all such mechanisms is assistance to build up an infrastructure within the region which could provide common services directly or through the pooling of national facilities of several countries. But regional structures should also enhance the development and improvement of the national marine infrastructures; that is the indispensable condition for effective participation in regional programmes and activities.

It is, therefore, quite understandable that, in keeping with the regionalization of IOC activities, the regionalization of TEMA has also increased and plays a relevant role in promoting the implementation of IOC global programmes through regional components.

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<sup>1/</sup> See, for instance, Resolution EC-VIII.13 of the Eighth Session of the Executive Council (Scientific Workshop to Initiate Planning for a Co-operative Investigation of the North and Central Western Indian Ocean (CINCWIO)) following a demand from delegates from the East African region to the 19th Session of the General Conference of Unesco (1976) for assistance in developing and strengthening new and existing marine research institutes in the region.

See also Resolution TEMA-II.21 (Establishment of New Marine Research Centres and Strengthening of Existing Ones) in Document IOC/TEMA-II.3 (approved by Resolution X-19 - The Working Committee for TEMA) of the Tenth Session of the Assembly, October-November 1977, which recommend facilitating the establishment of regional marine research centres in those regions.

<sup>2/</sup> Following a number of initiatives in this direction, including a Workshop on Regional Co-operation in Marine Science in the Central Eastern Atlantic (Western Africa) in 1982, Resolution XI-18 (Marine Co-operation on the Atlantic Coast of Africa) was replaced by Resolution EC-XVII.7 (Programme Group for the Central Eastern Atlantic).

Another aspect that deserves attention is the nature of the activities of regional bodies; most of them have hitherto been limited in their functions to planning and co-ordination of national participation in regional programmes, and to facilitate relations between States and channelling multilateral assistance to States needing and requesting it. An example of common services to participating countries is the compilation and exchange of oceanographic data and information. At the level of scientific education and training, initiatives have also been undertaken; the development of regional common services is an expression of this form of service to Member States.<sup>1/</sup>

But it is under the impulse of a new ocean regime that a significant increase in such provisions and a growing variety of arrangements are expected. Simple services, such as exchange of numerical data, are already being upgraded to more complex operations, such as data analysis and testing and development of models for such analysis. A general trend may be identified for existing bodies established under international agreements to become more directly involved in research and in the provision of services for research.<sup>2/</sup> Special forms of agreements could eventually be concluded in the future for co-operation in scientific activities at a more operational level.

(iv) Reinforcing the co-ordination of programmes and activities of competent international organizations

Competent international organizations are called upon by the Convention to co-ordinate their activities in the field of transfer of marine technology. The Convention explicitly stipulates that they "shall take all appropriate measures to ensure, either directly or in close co-operation among themselves, the effective discharge of functions and responsibilities assigned to them under Part XIV" (Art. 278). A special responsibility is laid down with respect to co-operation between competent international organizations and the International Sea-bed Authority in the transfer of skills and technology related to activities in the Area (Art. 273).

As a matter of fact, there is a long history of co-operation among organizations in marine affairs, particularly within the United Nations system. It was recognized early that, since many organizations dealt with the same broad subject, the risk of overlapping and the need to avoid duplication of effort and exploit complementarities made it imperative that they co-operate.

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<sup>1/</sup> IOC Workshop Report No. 32. UNU-IOC-Unesco Workshop on International Co-operation in the Development of Marine Science and the Transfer of Technology in the Context of the New Ocean Regime. Unesco, Paris, 1983.

<sup>2/</sup> Ibid.

In the field of marine science, formal inter-agency co-ordination began in 1960 when the Administrative Committee on Co-ordination (ACC) established the Sub-Committee on Oceanography and entrusted it, with, inter alia, the task of ensuring co-ordination with the newly established IOC.<sup>1/</sup> The later Sub-Committee on Marine Science and its Applications (1966) and then the Sub-Committee on Marine Affairs (1977) were given broader terms of reference to promote formal inter-agency co-ordination in these fields.

Partly as a result of the broadening of the terms of reference of the Sub-Committee on Marine Affairs and its increasing orientation towards the development of aspects of marine affairs, a need was felt by several organizations for a more specialized co-ordination mechanism in the field of marine sciences, especially to lend support to the activities of IOC. Accordingly, in 1969, the organizations most involved with marine science (UN, Unesco, FAO, IMO, WMO) formed the Inter-Secretariat Committee on Scientific Programmes Relating to Oceanography (ICSPRO) "to contribute to the development of effective forms of co-operation between organizations of the UN system substantially concerned with oceanic programmes...". The establishment of ICSPRO was endorsed by General Assembly Resolution 2560 (XXIV) in 1969.

It could be added that the co-ordination of activities of international organizations in the field of, for example, information exchange is ensured by special mechanisms as the FAO-IOC-UN(OETB) Joint Panel of Experts on the Aquatic Sciences and Fisheries Information System (ASFIS).<sup>2/</sup>

The need for rationalization and efficiency through a better allocation of responsibilities among international organizations, and an optimum utilization of available means - which are scarce relative to the requirements arising from the new ocean regime - makes it even more relevant than in the past that appropriate means be available for prompt exchange of information and consultation, as well as for common action by competent international organizations, in the fields of marine scientific research and transfer of marine technology.

Co-ordination of programmes and activities of international organizations is meaningful both at the global and regional levels. The fact that the United Nations organizations members of ICSPRO have regional structures and are giving impetus to regional programmes and activities should normally be followed by a corresponding effort of co-ordination of the activities at that level.

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<sup>1/</sup> See General Assembly, Thirty-Seventh Session, Fifth Committee - Third UNCLOS: Administrative and Financial Implications of the Draft Resolution contained in documents A/7/L.13/Rev and A/C.5/37/58, 24 November 1982; Cross Organizational Programme Analysis, C.P. Co-ordination, 23rd Session, Cross Organizational Programme Analysis of the Activities of the United Nations System in Marine Affairs: Report of the Secretary General, document E/AC.51/1983/2, 15 March 1983, and Institutional Structure of Marine Affairs Activities in the UN System, document COPA/MARINE/WP1, 26 April 1983.

<sup>2/</sup> Established by Resolution EC-V.13 of the Fifth Session of the IOC Executive Council, March 1978.

Similarly, the undertaking of TEMA programmes and activities in marine science, ocean services and related technology certainly benefits from the concertation of training and education programmes and activities in specific fields and for specific purposes with other international organizations.

This would mean, after all, pursuing further what has been taken by the Commission as an "indispensable necessity of collaboration with the ICSPRO agencies during all phases of planning, implementation and evaluation of TEMA components in the marine research programmes of the Commission".1/

It is expected that collaboration between the IOC and the International Sea-bed Authority, once established, will be feasible and useful.

It has indeed already been envisaged that the IOC should become more active in scientific research and in monitoring marine pollution and the marine environment in the Area and thus establish appropriate relations with the Authority.2/

The fundamental role of IOC in the transfer of technology being to contribute to basic education in marine science and to strengthen national infrastructures, it is foreseeable that it becomes more active in the field of training programmes in connection with the scientific basis required for deep seabed mining.3/

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- 1/ Resolution X-19 (The Working Committee for TEMA), the Assembly, at its Tenth Session, October-November 1977, decided to endorse the proposals for strengthening the co-operation between the Commission and the ICSPRO Agencies. Also, according to the Annex to Resolution X-19, the Working Committee for TEMA should "review the needs in training, education and mutual assistance in marine sciences and technology, as well as the programmes of international organizations concerned, especially those which are the members of ICSPRO", and "in consultation with other subsidiary bodies of IOC and with the ICSPRO agencies, TEMA was assigned the function of arranging the provision of scientific and technical education and the transfer of relevant knowledge and technical assistance to developing Member States in marine science aspects of ocean affairs in order to build up their national capabilities to participate fully in ocean research of interest to them, including IOC programmes, and to achieve self-reliance in marine sciences as a whole."
- 2/ Summary Report of the First Session of the ad hoc IOC Task Team to Study the Draft Convention on the Law of the Sea, and any Future Text Developed by UNCLOS, and the Implications to the Commission (Document IOC/TT-LOSI-I/3, 25 November 1981).
- 3/ Manpower Requirements of the Authority and Related Training Needs. Preliminary Report of the Secretary-General, Document A/CONF 62/82, 17 August 1979, p. 9.

(v) Responsiveness to the interests and needs of developing countries, and their preferential treatment

As pointed out above, the Convention on the Law of the Sea shows an overall concern for the interests and needs of developing countries, which are assigned special treatment with respect to access to benefits arising therefrom.<sup>1/</sup> This is particularly so in Part XIV of the Convention which deals with "Development and Transfer of Marine Technology".

Evidence of this can be found primarily in Art. 266 which opens Part XIV. Paragraph 2 points to developing States as the main beneficiaries of technical assistance in the development of marine scientific and technological capacity.

In the same spirit, the general duty of States to co-operate proclaimed in Art. 266 §1 is made dependent upon their capabilities".

When it comes to specifying the objectives to be pursued to achieve effective development and transfer of marine technology (Art. 268), reference is made to "the development of human resources through training and education of nationals of developing countries and especially the nationals of the least developing among them" (d). Among the measures sought to contribute to the achievement of those objectives, the undertaking of "programmes of technical co-operation for the effective transfer of marine technology to States which may need and request technical assistance in this field, particularly the developing land-locked and geographically disadvantaged States, as well as other developing States" is specifically mentioned.

Such concern for building-up the capabilities of developing countries appears to be met by the importance IOC has been assigning to programmes and activities in training and education. Such relevance is attested to by the IOC Assembly Resolution X-19 on the Working Committee for TEMA through which the Assembly, "aware of the increasing needs of developing countries for assistance in building up an adequate infrastructure to enable them to participate effectively in marine scientific research", expressed its conviction that "to achieve this goal there is an urgent need to incorporate training and mutual assistance components in future scientific programmes of the Commission to a much greater extent than hitherto".

This concern is reflected in Resolution XI-28 (Major Directions for the Commission's Future Programme)<sup>2/</sup> which asserts that the Commission's role and functions should be identified in such a way that it can concentrate its efforts on "promoting training, education and mutual assistance among its Member States, particularly the developing countries".

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<sup>1/</sup> One could recall the Preamble, which declares that the achievement of the goals of the Convention "will contribute to the realization of a just and equitable international economic order which takes into account the interests and needs of mankind as a whole and, in particular, the special interests and needs of developing countries, whether coastal or land-locked".

<sup>2/</sup> Resolution EC-XIII.12 (IOC's Role in the Education and Training of Personnel, and in Mutual Assistance) goes in the same direction.

Yet the philosophy of the new ocean regime, as evidenced in the paragraphs above is of a kind so as to reinforce the legitimacy of the present direction of IOC's role in training and education.

The IOC was, as a consequence, led to recognize that increasing efforts aimed at obtaining and mobilizing means for helping the developing States would imply that more resources be allocated to the TEMA programme.<sup>1/</sup>

Such were considerations underlying the launching of the Unesco-IOC "Comprehensive Plan for a Major Assistance Programme to Enhance the Marine Science Capabilities of Developing Countries <sup>2/</sup>, the central purpose of which is to strengthen overall marine science capability, particularly by infrastructural development in the developing Member States of IOC. This Plan relies precisely upon a strategy in which the present level and forms of assistance by Unesco and IOC would be complemented and expanded through the development of projects, primarily at the regional and sub-regional levels, aimed at enhancing national and regional capabilities of Member States in marine sciences and ocean services. The fundamental components of the Programme then are: (i) identification of needs and facilities already available for coping with them; (ii) formulation of proposals for action through projects; and (iii) acquisition of funds and other means of assistance required.

#### CONCLUSIONS

Under the Convention on the Law of the Sea adopted by the Third United Nations Conference on the Law of the Sea in 1982, new rights and duties of States have been established with respect to major uses of the oceans and their resources and related activities, including marine scientific research and the development and transfer of marine technology. These issues received specific treatment in Parts XIII and Part XIV of the Convention.

In this connection, the main aim of the Convention appears to be that of creating favourable conditions for the access of all countries to the science and technology required for them to be able to exercise the rights and comply with the duties resulting therefrom and to participate on an equitable basis in maritime activities.

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<sup>1/</sup> Resolution EC-XIII.12.

<sup>2/</sup> Resolution EC-XIII.15 (A Comprehensive Plan to Enhance the Marine Science Capabilities of Developing Member States).

Creating favourable conditions was deemed to imply, as a necessary condition, that States co-operate with each other in the conduct of scientific research and ocean service activities, in exchanging scientific information and knowledge and in promoting the establishment of national, regional and international infrastructures for the development and transfer of marine technology.

Co-operation may be undertaken directly among States concerned or through competent international organizations. The relevant functions these are expected to perform, particularly the organizations of the United Nations System, comes out clearly from provisions in Part XIII and Part XIV. This is the case in the facilitation of agreements which may promote scientific research, and in the development and strengthening of scientific and technological capabilities in developing countries.

The Intergovernmental Oceanographic Commission is expected to play a decisive role in the implementation of the objectives of the Convention and of the New Ocean Regime, in the field of marine science, ocean services and related technology, training, education and mutual assistance.

A review of the work of the Commission in recent years makes it clear that the will of its Member States is that the IOC's potential role be realized in practice. The present paper was merely aimed at pointing to the most apparent tendencies of the evolution in its functions, structure and activities.

An overall impression of continuous evolution is gained, the direction of which is guided by some clear objectives and principles. The process may be said to have started from the direct perception of the needs by Member States as the new system of maritime jurisdiction and of relations among States was being shaped through the practice of those Member States. Later on, the formalization, by way of a Convention, of the new rights and duties of States, and, indirectly, of the responsibilities of international organizations, confirmed the correctness of the direction being taken by the Commission.