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Meeting Paper proposing an <international training programme> designed for high-level ~~to improve~~ ^{in the field of oceanographic research} ~~<personnel> engaged in <science administration>~~ who would participate in the first ~~<developing countries>~~; outlines ~~principled~~ ^{principles} guidelines of the proposed place in regional ~~<workshop>~~ ^{<seminar>}s, then in a general ~~<training course>~~ ^{and of} ~~<oceanography>~~ its ~~<educational programme>~~

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Bello, E.G.

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UNITED NATIONS EDUCATIONAL,
SCIENTIFIC AND CULTURAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

Fourth Session of the Executive Council

Ottawa, Canada, 17-22 June 1974

A STUDY PROJECT ON MUTUAL ASSISTANCE BETWEEN STATES LEADING
TO A TRANSFER OF SCIENCE AND TECHNOLOGY

by Dr. E.G. Bello

S U M M A R Y

Secretariat Note

The attached document is a Summary of the above paper prepared by Dr. Bello in 1973 and submitted to the eighth session of the IOC Assembly as document IOC-VIII/15.

The Summary consists of a short introduction followed by a series of extracts (in Dr. Bello's own words) from Part III of the full paper, being the practical problems of implementation of the training and education programme.

Dr. Bello proposes herein that scientific administrators "from the highest echelon of government from which a man could be spared for a period of four months" should be nominated by governments: firstly, for participation in a series of two-week Regional Workshop/Seminars which are intended to provide fora at which participants can specify their needs, list problems and priorities, and finally define objectives and the means of obtaining them; and secondly, for participation in a five month (Part I - two months, mid-course break - one month, Part II - two months) General Course. Whilst noting that the General Course should be designed for the benefit of marine science administrators 'with little or no scientific background', Dr. Bello has prepared a detailed General Course content for consideration.

The Secretary in asking for comments on Dr. Bello's proposal, draws the attention of Member States to the planned series of meetings of ad hoc regional groups of experts ... to identify specific training needs and to follow up recommendations of the TEMA group in full, as approved by IOC resolution EC-II.12. It is considered that this existing programme should be taken into account when the need for the two-week Regional Workshop/Seminars proposed by Dr. Bello, is being considered.

SUMMARY OF

A study project on mutual assistance between states
leading to a transfer of science and technology

by Dr. E.G. Bello

PART IMarine Science and Marine EnvironmentIntroduction

Successful use of the sea depends largely on having strong scientific capabilities. Oceanography should be looked on as basic marine research involving the utilisation of all appropriate basic scientific disciplines towards the understanding and solution of the scientific problems of the sea.

The Position of the Less Developed Countries (LDCs)

Hitherto, the policy for the application of science to development in many less advanced countries was neither clear nor consistent. Often specific needs did not coincide with the trends of scientific interest in the developed world. Most of the activities in the less developed countries place great emphasis on fisheries studies. Therefore even when reasonable marine activity exists, there is a high degree of imbalance in favour of biology. The proposed training of Policy Makers and Science Administrators will help many of the LDCs understand the value of the marine environment for the development of their national economy. The development of marine science will be given due attention and consideration in the national budget. More light will be thrown, especially at the upper governmental level on the functions and the role of the Inter-governmental Oceanographic Commission.

The individual who does in fact dominate the activities of the trained professionals is the government administrator. His knowledge of what is going on and what is directly involved can tilt the balance in favour of the marine scientists and upgrade their position in the society. The lack of knowledge of the administrator can, on the other hand, be and indeed has been the stumbling block to progress and development in this field.

The essential thing is not the training of professionals but convincing governments of the developing nations to make adequate provisions well in advance in their policy arrangements for a trained individual to find a place to fit into and exercise effectively the profession which, in many cases, involved years of hard work. But it is commonplace to find a number of highly trained marine scientists from the less developed countries lost to the developed nations because of the simple reason that no jobs were provided in their home countries. Even where the professional

is absorbed into the society, in time he finds that he lacks the essential equipment to carry out his responsibilities. It is therefore necessary to begin the IOC proposed training programmes not from the beginning but from above. By this we mean the high level administrators - those who are, or will one day be in control. The importance and the possible dividends cannot be over exaggerated.

PART II

Principal Guidelines to the Proposed Training Programme

Chapter I: Selection of Candidates

Participants envisaged

The kind of participant envisaged is a scientific administrator in the highest echelon of government from which a man could be spared for a period of four months. Where the above is not possible, the individuals should be men of high calibre, in line for promotion.

Eligibility of candidates

Academic achievement, ability, and a strong personal desire to further the objectives of the project should be the common denominator. Certain individuals may hold the view that it is wrong to send a mixture of people. But it must be borne in mind that projects of an interdisciplinary nature may be such that participants having rather widely varied backgrounds can profitably participate. One important attribute is that participants must come with a clear awareness of the aims of the programme and a personal commitment to contribute to them.

Basically, persons nominated by Governments should have: (a) good university degree(s), post-graduate background, and/or many years of administrative experience; (b) they should hold a position that will provide opportunity to use whatever they gain, to assist colleagues in government to gain an appreciation of the potential importance of educational principles and procedures that have been highlighted by the programme. Furthermore, governments that encourage and support candidates in taking such special training must also be prepared to encourage and reward their efforts to apply the knowledge they have acquired. Participants should be persons who could arouse the interest of others in exploring some of their ideas. Candidates may or may not be scientists.

IOC responsibility in deciding on candidates for the Regional Workshop/Seminar

The Secretariat should take the responsibility of identifying whom to train, i.e. the individual who should attend the workshop/seminar. Although governments may nominate their own candidates, they should still be properly scrutinized. The Secretary of the IOC should in this regard offer assistance and advice if requested, or make suggestions to help the particular government in nominating the proper persons.

Selection of participants for the General Courses

The Workshop/Seminar Directors should advise the IOC on this point. Directors, having taken everything into consideration, namely aptitude, performance, contribution, ability, their general knowledge of the participants, including in particular the available funds for the general courses, will make recommendations to the IOC. The Directors should take into account the overall benefit to individuals and governments.

Chapter II: Regional Workshop/Seminar

Multilateral workshops would seem to be a necessary first step.

Purpose

The purpose of the two-week Workshop/Seminar is to provide a forum for all those involved to specify their needs. Then to arrange problems in order, and to define objectives and the means of attaining them.

It should define each operation in terms of objectives and equipment. Opportunity will be provided to advise beginners that the best approach is for a country to start in a small way, and then advance slowly but steadily.

The Workshop/Seminar is to provide the initial solid foundations with which to support an ocean management system. The less developed nations will ascertain what oceanographers can and cannot do in regard to their country's problems.

Finally the regional workshop must consider regional and international co-operation.

Locations of Workshop/Seminars

A series of workshops in different areas is therefore strongly advised. Suggested geographical locations would be (a) Latin America, (b) South-east Asia, (c) The Middle East, (d) The Caribbean Islands, (e) The Mediterranean countries and (f) The African continent which could be grouped under two heads - the English speaking countries, and the Francophone nations. In all, there would be a total of seven different workshop/seminars.

Scope and nature of programme of work

The workshop/seminar must explore in depth particular subject areas or develop a programme technique that is significant for strengthening or recognizing the marine science structure. All previous information on oceanography in the region should be studied. During the first day or two, participants should present status reports.

The programme of work will consist in the elaboration of curricula and content. During the first day or two, participants should present status reports. Their widely varying substance and candour will no doubt present a unique source of facts and perceptions. To make them more useful and to identify the common themes among them, they should be well discussed by the whole group. This may be followed by lectures, demonstrations, and discussion periods, to prepare them for group activities.

It is expected that the approach indicated above would help the experts in giving the participants some preparation concerning (a) the principles and theories of marine environment, (b) the principal guidelines in training programme elaboration, (c) the rôle and different processes involved in marine science and technology, (d) the principles of evaluation and (e) the crucial point regarding the relationship between professional training and the practical consequences should be well emphasised.

Participants should treat in great detail the all important question of lack of communication between scientists and administrators in different countries and how to improve them. To cater for the multidisciplinary aspects demanded, maritime law and the economic aspects of oil production, should not be forgotten. If possible the programme of work should be one that can lead to the formulation of international co-operation and common projects between science research institutions on regional and international bases.

The programme of work should show how to utilize modern administrative methods and techniques in the aspect of training, supervision, control, and assessment for purposes of maximizing efficiency in science and technology. The rôle of "science administrators" should be fully realized.

The real meaning of marine affairs should be explained as well as the scope and nature of the marine resources. The topics that must be amplified should therefore be those relating to the pressing problems of fishing, ocean management, prospection of minerals, and tourism. In addition, it would be proper to accord certain priorities to physical oceanography, geology and biology of the continental shelves, to ports and harbours, as well as the means of putting these into operation.

The view is constantly advanced that every participant must present a general summing up of the state of marine science in his home country, the research investigations carried out, and the benefits that have been derived from effective use of the marine environment.

The programme of work must include the presentation of information on the activities in the region, of all relevant international bodies. At the end of the two week period, the participants should have acquired sufficient knowledge and motivation to (a) organize and evaluate with the aid of experts their own national programmes and priorities in marine affairs, (b) organize and evaluate with the aid of experts their national training programmes with respect to science and technology. The views of all concerned should also be ascertained about how the next general course should be run.

Setting up working groups

Each group could make a study of a particular assignment and its economic circumstances. With the consent of the Director, a group may adopt its own assignment objectives. It may then identify the problems involved in the attainment of the regional development goals and then devise elements of curriculum corresponding to and answering these problems.

Wherever and whenever possible concepts should not be presented beforehand, but arrived at inductively through an interdisciplinary approach and positive action, combining theory and practice in its progression towards the objectives. Though activities carefully planned for particular educational purposes should be the essence of every short-term training programme, additional and unexpected learning has an opportunity to flourish in those encounters that are unplanned and unstructured.

Educational materials

The objectives of the workshop/seminar as well as the list of participants and documents should be sent to all those invited about two months before commencement.

Questionnaire for evaluation of the workshop/seminar*

A mechanism must be introduced for systematic staff-participants' review of the training experience in order to assess its vitality in meeting needs, and to introduce changes where they are required.

A review-preview session should be possible especially at the end of the first week of the workshop.

The termination of the workshop/seminar should provide an opportunity for a second review-preview session.

Continued evaluation by group leaders (co-ordinators)

The group leaders are those persons charged with responsibility for detailed planning, co-ordination of resources, supervision of operation and follow-up of participants.

Compendium of lecture notes

At the end of the workshop/seminar, a compendium of lecture notes should be compiled by the co-ordinators. Production of these notes should be a co-operative enterprise in which authors, co-ordinators, directors, participants and the IOC Secretariat, work together in deciding which concepts, methods, and terms merit inclusion.

Chapter III: Staff Directly in Charge of Operations

Directors

The responsibility for directing the development of each regional workshop/seminar should be vested in two Directors, one local and one non-local. The Directors of the project are the individuals whom the IOC Secretariat views as its liaison with the workshop/seminar, so far as the academic or educational aspects of the programme are concerned. Therefore it is the Directors named in connection with the workshop/seminar to whom the IOC will turn for information about the project.

Non-local Director (foreign)

A Director should be a good leader, and a man of sound judgement. He ought to be a scientist involved at one time or the other with science

*Questionnaire is available in the original unabridged text

administration. Above all the non-local Director should be a person with good international connections.

Local Director

He may or may not be a scientist. However, where it is possible to hire a scientist such option should be exercised.

Background to the Programme Director

The Director should be a scientist.

A Director could be a high government official. Someone who knows both administrative and international problems. He would be familiar with budgeting and advising the government. The appointment of legal men holding government positions has been suggested many times.

Functions of Directors

The Director should see that all reports are submitted and that a compendium of lectures is compiled. Both Lecturers and Group Leaders should be directly responsible to him. It is his duty to take decisions affecting the day-to-day running of the programme. The Programme Director is responsible to the Secretary of the IOC for his actions.

The selection of the participants in the general courses from among those who attended the workshop/seminar is the responsibility of the Directors; acting with the collaboration of the Lecturers, Co-ordinators and the IOC Secretariat, if need be.

Lecturers

It is important to include among the lecturers someone skilled in the process of facilitating active group and individualized learning.

Professors should come from different parts of the world. Those from the region should be given ample opportunity to participate in the programme. In each case, however, lecturers ought to possess a sound knowledge of the problems of the area and other parts of the world. People from the business world may serve a useful purpose. They should be included.

Lecturers must cover a wide spectrum, namely political science, economics, sociology, psychology, law of the sea, theoretical oceanographers who could teach how to collect and possess data, the rest could be experimental marine scientists, i.e. experts in different fields of marine science and oceanography. Experts have the duty to guide programme design so as to ensure active involvement of participants in the task of learning.

Co-ordinators (group leaders)

They should be responsible for sharpening, clarifying and shaping of the content focus which in the final analysis must be specific enough to communicate to prospective participants what they can expect to gain from the experience.

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Obligation of participants

In accepting to participate in one or some or all of the programmes of education and training, an individual acknowledges his intent to participate to the full extent of his abilities.

Simple penalties may be imposed for breach of conduct.

Chapter IV: Reports of ParticipantsFinal reports

The final reports of all concerned - the participants, the Co-ordinators, the Lecturers and the Directors - represent a complete evaluation of the accomplishments of the project. Final reports are usually due at the end of the period of activity of each project.

Follow-up of training programmes

The follow-up which is an essential part of an international programme of this magnitude should be the responsibility of one organism. This should be the responsibility of the Secretary of the IOC who should carry it out during the following months or years for as long thereafter as is both feasible and meaningful. Follow-up will depend on national attitude. If necessary on-site visits may be arranged by the IOC Secretariat. A questionnaire to assess whether the desired objectives have been achieved should also be used in all cases where this is possible.

Chapter V: General CourseIntroduction to course format

The general course merely fills the lacuna left by lack of familiarisation with the different aspects of marine affairs. Such gaps that may affect the judgement of a science administrator when deciding on the overall perspective of the marine environment.

The General Course will be divided into two distinct parts, (a) General Course - First Part, which runs for two months and (b) General Course - Second Part, the duration of which, is for another period of two months. In between the first and the second parts is the Mid-Course Break, which should last for not more than one month. The main purpose of the break is to allow each representative to return to his home country for consultation. The second part of the General Course is both for specialization and exchange of ideas.

The duration of the first part of the General Course shall be eight weeks. During this period, accent will be placed on lectures, and discussions of the subject-matter.

(a) Some of the selected training projects in marine science and related subjects, compiled by the IOC Secretariat, and presented to the first Working Group on Training, Education and Mutual Assistance (TEMA), offer good examples of the level of courses that may fit the needs of the participants in this programme.

For example, elementary interdisciplinary course in marine science and its applied aspects, supplied by the Department of Economic and Social Affairs of the United Nations, is designed for the benefit of marine science administrators with little or no scientific background. The programme would include, inter alia, a short introduction to the physical and chemical properties of sea water, air-sea interaction, currents, waves and tides, the seabed, marine biology and biological resources, non-living resources and other uses of the sea, protection of the marine environment, the United Nations system and the oceans.

The most important aspect of this curriculum is that The Ocean Economics and Technology Branch of the Department of Economic and Social Affairs of the United Nations would be willing to consider to contribute to this training course by providing lectures in two areas namely, (a) mineral resources and related technology, and (b) the United Nations system and the sea.

The first part of the general course must deal among other things with the maps of fishing areas in the world, species identification, evaluation area, i.e. knowing what fishing stock there are, a fair knowledge of the meaning of upwelling, i.e. apart from being considered the greatest source of food in the ocean, how much fish can be caught, possibilities of catching more, problems of transport and marketing, catching equipment, trade, processing, and all problems connected with the exploitation of marine resources, conservation, what is meant by more rationally organized fisheries. The FAO could provide assistance in making projections or forecasts and to some extent in formulating policies for research and developing. The programme could also include manpower study in fisheries undertaking, how a programme for fisheries co-operatives works, and a good knowledge of the up-to-date fishing institutions.

(c) If the curriculum of the general course must incorporate certain aspects of university courses, then the accent must be placed on simplicity. Introductory course in oceanography may cover basic phases including submarine geomorphology and structure. Ocean currents, water masses, waves and tides and biological oceanography is to be introduced briefly in an elementary but comprehensive way. Ocean research such as fisheries development, port development and the implications of a research station must not be overlooked in the general course. In addition, they need to grasp something of the tempo of science, how long certain experiments last, the difficulties of resource survey and the need for computers. It should incorporate the geo-morphology of the oceans to clarify their different parts and the processes going on in them.

A more detailed general course content is outlined as follows:

Parts to be incorporated in the programme

1. Basic course in general oceanography, including marine geography.
To be given each day for four hours for one week (a total of 20 hours).
2. Basic course in marine resources including the categories enumerated hereunder:
 - Physical resources, e.g. tidal power
 - Chemical resources, e.g. bromine extraction
 - Geological resources, e.g. heavy mineral sands, off-shore oil

Biological resources, e.g. fish stocks

Miscellaneous resources, e.g. tourism, transportation

To be given each day for four hours for a week, making a total of 20 hours.

3. Courses in general oceanography and marine resources

This should be taught concurrently in the morning and in the afternoon during the first week.

4. A basic course in marine resource exploitation methodology, i.e. ocean engineering. To be taught four hours a day for one week (total of 20 hours).

5. A basic course in marine resource economics. To be given four hours a day for one week (total of 20 hours).

6. Courses in marine resource exploitation methodology and marine resource economics would be taught concurrently in the morning and in the afternoon during the second week.

7. A basic course in marine pollution. To be given four hours a day for one week (total of 20 hours).

8. A basic course in ocean law including both domestic and international law, coastal law and marine pollution law. To be given four hours a day for one week (total of 20 hours).

9. Basic courses in marine pollution and ocean law would be taught concurrently in the mornings and the afternoons during the third week. Total of course time would be one month. Total of course hours would be 160. Total of contact hours would be 140.

Part of the general course may also deal with the following:

1. Resource exploitation problems:

Sources of funding for exploitation and costs involved (foreign or domestic, bilateral or multilateral)

2. Technology transfer requirements and costs.

3. The effects of resource exploitation: pollution, non-renewable resources and costs; renewable resources and costs; economics including marketing (domestic and foreign); multiple use development of new industries; trade-offs and cost-benefit ratios.

Spin-off implications of marine sciences

Since we are creating a cross-disciplinary awareness it may be necessary to incorporate in the programme of work other subjects which play an important rôle in the field of marine sciences.

For example the core courses at the University of Rhode Island, for the degree Master in Marine Affairs, include Basic Ocean Engineering, General Oceanography, International Law, Marine Geography, Economics of Marine Resources and the Marine Affairs Seminar. Other subjects are

finance, community planning, geography, geology, oceanography, ocean engineering, political science, and resource economics.

The Department of Economic and Social Affairs, United Nations, suggested a general approach to related subjects aimed at policy-makers or advisers to policy-makers counselling governments on the complex issues of uses and management of the near-shore areas. This is contained in an IOC-TEMA working group document.* Topics include administrative, legal and economic problems, that may arise in the management of these areas, decision-making as to exploitation licences, shipping and fishing rights, optimization in the use of these areas with regard to exploitation of living and non-living resources, shipping and ports, preservation and conservation measures, disposal of wastes, dumping, recreation and tourism.

Lectures

The bones of the course should be a series of lectures, interlaced with seminars, discussions and visits to laboratories.

Interaction between staff and participants, is an essential element of the programme.

Informal meetings comprising the entire group of staff and participants should be planned on a two-weekly basis to provide an opportunity for public discussion of thoughts and feelings about the whole programme.

Tours and field training

Field work should be considered as an integral part of the curriculum. But it ought to be a minor component of the course.

Chapter VI: Mid-Course Break

Consultation with governments

The participants will find out for themselves whether their countries would be interested in some of the various aspects of the marine environment enumerated during the course. Participants should determine what they believe, on the basis of this contact, to be their countries' needs and priorities in marine science, technology and research.

The other necessary part of the mid-course break is to ascertain what means are envisaged toward the realization of the objectives stated by these countries. In addition, the nature of assistance to be requested from the Intergovernmental Oceanographic Commission in the transfer of science and technology should be identified.

It is especially essential at this stage that participants should establish a means of continuous flow of information and communication with the Secretariat of the IOC on all present and future objectives. This will help the IOC to offer effective assistance to those who may need it, from time to time.

Before participants return to their home countries, the Directors of the General Course, and members of the staff should encourage them to correspond with any of them directly concerning any problems they may encounter in the course of their deliberations.

Chapter VII: Second Part of the General Course

Attachment and specialization

The programme is primarily designed to provide a deeper knowledge of those areas of the marine environment which correspond to the needs of each country.

Specialization may include among other marine problems, one of the following: environmental pollution, ecological control, research and interpretation of data, fish population, application of meteorology in economic and social development, extraction of minerals, transportation and recreational aspect of the marine environment. International bodies dealing with this subject like IMCO, FAO and WHO, to name only a few, could help participants during the first part of the general course by elaborating on this sector and the issues involved.

Institutes suitable for attachment

Many colleges and universities would consider accepting readily a number of participants pursuing part of their training in their centres. It would however be the duty of the organizers of the programmes to determine (a) how many of such centres are available, (b) which fields they specialize in, (c) how many participants they can accommodate, (d) facilities conveniently disposable and (e) what period of the year would be suitable to accept participants.

By joining with scientists in certain institutes, this will in fact make it possible for smaller centres to serve as hosts, especially for a project of this nature. Some relatively small campuses could indeed provide unusually favourable environments for projects built around scientists brought in from leading universities.

Concentration on problem areas

Participants can choose between a number of projects, carefully prepared by the institution, so that each will be enabled, as far as possible, to adapt his studies to his later needs. They will meet at the allocated centres for an initial one or two-day session during which lectures, demonstrations, and discussion periods prepare them for individual work to be carried out. The participants will be located within the area of the centres and supervised by outstanding experts in the chosen fields. They should take whatever time is necessary to review the literature on the subject and examine thoroughly, in the field, the area to be studied.

Rudiments of field performance

This may incorporate laboratory experience aboard ship. Participants should be involved in topic analysis, sampling and experimental design as well as the conduct of special kinds of field experiments.

The final stage of training and education programme

Participants after completing their work in the various centres of attachment and specialization, return to the main course campus. This aspect should bring the whole group together for a short period of four

weeks. The major part of the time will be devoted to seminar work, discussion and involvement in current research problems.

Each participant should prepare a written report of his experiences and views on the course. Effective compilation of data becomes a major part of the responsibility of the staff and Directors of the training programmes. Participants in their final reports would be specially required to express the view whether the project is worth repeating, and if the response is positive, at what intervals. In the case of a negative answer, reasons should be advanced to support that view.

Textbooks and Language Problems

Textbooks for the general course

Few textbooks suitable for training personnel from the less developed countries are available. There are even fewer books written with the needs of the developing nations in mind. If any attempt is to be made to remedy this critical situation, experts involved or interested in preparing manuals and textbooks, should remember to stress examples of problems in the less developed areas. The presumption is that this would help the less developed countries in identifying themselves with the issues raised in the textbooks or manuals, and applying the solutions proposed if any.

Oceanography is a field that will attract many young people in the near future as more attention is drawn to it, and adequate publicity is given to the benefit of the ocean sciences to a growing nation.

Language problems

It would be easier to find English-speaking experts to deliver lectures, conduct seminars and hold discussions at the general course.

In the final analysis, English should be the language of the general course.

PART III

Practical Matters of Paramount Importance

Chapter I: Facilities

General picture of location

Germaneness of the university campus is essential. The ideal location is one where ancillary expertise exists. It must be a place where participants can live together, talk together, and get to know one another. Location should not be a centre like Paris, Rome or London, where certain individuals could be obliged to live in different areas of the city.

Facilities of particular nature

There must be for instance a good library with sufficient reading rooms to encourage private studies. Modern science laboratories should be

available so that participants can see scientists at work. In spite of the fact that the main teaching language may be English and all must be reasonably proficient at entry, yet the availability of a language laboratory in the campus would be of considerable assistance to those less skilful than the others. Availability of research vessels is a condition sine qua non. A combination of academic work and conventional meetings alone cannot engender a sense of togetherness. Other activities must be available to prompt the participants' social interests. Real understanding may be achieved in such circumstances. Academic programmes should therefore be interwoven with recreational facilities.

Chapter II: Co-operation of Other Bodies

(Intergovernmental and Non-Governmental)

IOC as synchro-scope

The task of the Intergovernmental Oceanographic Commission is plainly one of co-ordination and harmonization. The Commission's function is to put international scientific co-operation at the disposal of all those institutions who know about the oceans, thereby paving the way and providing the necessary framework and initiative for favourable governmental decisions with respect to these problems.

Financial support for collaborators

It is certain that the agencies - intergovernmental and non-governmental - invited to participate will not be strong enough to provide financial support.

General Conclusions

The essential point is that the representatives of the developing nations should now be allowed to speak for themselves. They must have some idea of what their national priorities are. It is their duty to define their programme of activities as they see them. In the minds of many new nations oceanographic research is less tainted politically, and valuable from an educational point of view, yet they feel the urge to stand in its way, either because resistance will draw attention to their insignificant position in the marine environment, or because it is considered the best way to disrupt and disorganize a whole developing system which leaves them totally ignored. The new nations need to develop their own scientific capabilities if they ever hope to be able to lift themselves above dependent poverty.

The economic opportunities in the oceans are open to all nations both advanced and less advanced.

It is quite possible that one of the by-products of the training of Administrators may be the establishment of Regional Centres for the Development of Oceanography (RCDO) to co-ordinate efforts on a regional scale; to help avoid expensive duplication of efforts among the developing countries; to assist the IOC in all its activities within the region; to compile directories of institutions and courses and

experts in the area; and to disseminate information about the activities of other Specialized Agencies and international bodies doing some work in that region. Experience in Europe shows this. The proposed training programme of administrators gives the IOC the excellent opportunity of stressing the importance of regional collaboration. The RCDO will help provide an answer to fundamental issues when common resources are to be exploited.