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Unesco Science and Technology Activities in Latin America and the Caribbean

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PREFACE

The Unesco series "Science policy studies and documents" forms part of a programme initiated by the General Conference of Unesco at its eleventh session in 1960, which aims at making available factual information concerning the science and technology policies of various Member States of the Organization as well as technical studies of interest to policy-makers and managers.

The country studies are carried out by the government authorities responsible for policy-making in the field of science and technology in the Member States concerned.

The selection of the countries in which studies on the national science and technology policy are undertaken is made in accordance with the following criteria: the originality of the methods used in the planning and execution of such policy, the extent of the practical experience acquired, and the level of economic and social development attained. The geographical coverage of the studies published in the series is also taken into account.

The technical studies cover planning of science and technology policy, organization and administration of scientific and technological research, and other questions relating to science and technology policy.

This same series also includes reports of international meetings on science and technology policy convened by Unesco.

As a general rule, the country studies are published in one language only, either English, French or Spanish, whereas some of the technical studies and the reports of meetings are published in several official languages of the Organization.

The present publication describes briefly the activities carried out by Unesco in the field of science and technology in Latin America and the Caribbean. As a rule, mention is made only of the most significant current activities carried out or planned by the Organization in 1981-1984. The activities described are those carried out by the eight specialized Programme Divisions of the Science Sector of the Organization, working in close co-operation with the Operational Division of the same Sector; a Division of Science, Technical and Vocational Education of the Education Sector; the Operational Division of the same Sector; a Division for International Statistics on Science and Technology; a Division of the General Information Programme and the Unesco Regional Office for Science and Technology for Latin America and the Caribbean.

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INTRODUCTION

A. Principles of action

Unesco is the Specialized Agency of the United Nations entrusted with the international promotion of education, science, culture and communication with a view to furthering peace among nations and enhancing the well-being of all peoples of the world. This objective of furthering peace and development gives Unesco's action both an *ethical* and a *practical* dimension which are characteristic of programmes carried out by the Organization.

In the execution of its tasks, Unesco works in two main ways: encouraging *intellectual co-operation* and developing *operational projects*. Intellectual co-operation is fostered through programmes concerning the promotion of ideas and the advancement of knowledge in the fields falling within Unesco's constitutional responsibilities. This is done mainly by conducting international co-operative research projects, by organizing international conferences and seminars, and by issuing publications. The operational function is essentially performed through the so-called technical assistance programmes of the Organization.

Furthermore, Unesco's activities in the various regions of the world have as their primary purpose that of giving the countries concerned in those regions the benefit of the worldwide experience acquired by the Organization in the areas of education, science and culture while also helping them to solve their related problems. Seen from this angle, activities at world, regional and national level are complementary and mutually supportive. They reflect one aspect of mankind's organized effort towards peaceful coexistence, mutual assistance and intellectual co-operation.

B. Organizational structure

At the present time, Unesco's activities concerning science and technology are primarily the responsibility of eight programme divisions belonging to the Science Sector of the Organization. Working in close co-operation with these programme divisions is a special division responsible for implementing "operational" projects, and a division for international statistics on science and technology. Finally, the Regional Office for Science and Technology for Latin America and the Caribbean (ROSTLAC) co-operates closely with these various units at Headquarters and provides them with the necessary support.

C. Aims and scope of this report

This report gives a brief description of Unesco's activities in Latin America and the Caribbean in the field of science and technology (excluding social sciences). For the sake of brevity, and as a rule, mention is made only of the most important and significant activities carried out or planned for 1981-1984.

The report covers the activities of (1) the eight programme divisions of the Science Sector, of its Operational Division and of its field office, the Regional Office for Science and Technology for Latin America and the Caribbean (ROSTLAC); (2) the Division of Science, Technical and Vocational Education of the Education Sector and of this Sector's Operational Division; (3) the General Information Programme Division (Scientific and Technological Information); and (4) the Division of Statistics on Science and Technology of the Office of Statistics.

D. Structure of this report

Part I of the report gives a synopsis of activities according to three levels: world, regional and national. Part II contains a description of activities by subjects. For each programme activity entry, the information appears under a number of headings according to Table I:

Table I - Types of information provided for each activity

HEADINGS	WORLD	REGIONAL	NATIONAL
Title (and acronym if any) of the activity/programme/project	*	*	*
Brief description (if necessary)	-	-	*
Principles of action	*	-	-
Main aims (short or long term)	*	*	*
Specific activities (current or planned for 1981-1983)	* (at world, regional or national level)	* (at regional and national level)	*
Achievements (and work in hand, indicating whether significant results have already been obtained)	*	*	*
References	-	-	(N° of UNDP project)*
Linkages (if any) with other activities	*	*	*
Background information (origins,date of launching, duration, etc.)	*	*	*
Organization(s) responsible if other than Unesco	*	*	*
Organizational machinery (responsible for planning/co-ordination/ implementation)	*	*	*
Participants (if other than all the Member States of Unesco)	* (countries and organizations)	* (countries and organizations)	-

* = Data given
- = No data

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PART I

SYNOPSIS OF ACTIVITIES

1. Activities of worldwide scope

Through its worldwide programmes, Unesco aims at combining the efforts of all its Member States towards the achievement of common goals. The participation of Asian and Pacific countries in these worldwide programmes is of particular importance in view of the geographical sweep and huge population of the region, as well as in view of the very significant scientific capabilities attained by a number of countries in that part of the world. These countries have both a lot to give and a lot to gain as far as interaction and co-operation with other Member States within or outside the region is concerned.

It should be stressed that the Secretariat of Unesco never loses sight of the need to associate *all* Member States as closely as possible with the activities undertaken by the Organization as part of its worldwide scientific and technological programmes.

2. Activities of a regional nature

a) Role of the Regional Office for Science and Technology in Latin America and the Caribbean

Unesco's science and technology regional programmes in Latin America and the Caribbean are implemented mainly through the field office.

The Regional Office for Science and Technology for Latin America and the Caribbean serves the following countries: Antigua-Barbuda, Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Dominican Republic, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela, Bahamas, Belize, St. Kitts-Nevis.

The regional office, the responsibilities and capacity for action of which are now being strengthened in accordance with Unesco's decentralization policy, has the task of encouraging, preparing, carrying out and supervising Unesco's regional programmes in the scientific and technological field, whether financed under the regular programme or under the United Nations Development Programme. At the request of the programme divisions concerned, it also assists Headquarters' specialists in undertaking national programmes and bringing them to a successful conclusion.

The regional office assumes the following general functions:

(i) *regional programmes:* participation in the preparation, planning, execution and evaluation of the Organization's regional programmes in science and technology, whether financed under the regular programme or from extra-budgetary sources;

(ii) *advisory services:* in liaison with Headquarters, regional offices provide advisory services to Member States, at their request, on scientific and technological matters of a national character. With this end in view, the regional offices maintain contact and collaborate with the national authorities responsible for policy-making in science and technology;

(iii) *training of personnel:* in collaboration with Headquarters, regional offices organize training courses, symposia and seminars devoted to scientific and technological subjects of interest to the countries in their region;

(iv) *intergovernmental meetings:* the regional offices participate in the preparation and follow-up of conferences of ministers and government experts responsible for science and technology;

(v) *studies and research:* the regional offices collect available information and undertake studies in the countries in their regions which help Member States to establish and carry out scientific and technological projects;

(vi) *support for operational programmes:* in pursuance of the decentralization policy, the regional offices, with the assistance of Headquarters (in particular, the Operational Programmes Division), co-operate with Member States for country programming, the preparation of projects and the evaluation of the results achieved. The regional offices help the various technical assistance experts in their work by taking part in inspection missions and participating in the general guidance, supervision and co-ordination of operational projects in their regions.

In the implementation of these tasks, the regional office maintains close links with the Unesco Regional Co-ordinator and co-operates with the Unesco Regional Office for Education in Santiago, Chile, with the National Commissions of Member States, with the United Nations Economic and Social Commission for Latin America (ECLA), the field offices of other agencies and programmes of the United Nations system, regional banks and the resident representatives of UNDP, as well as with other intergovernmental and non-governmental organizations of a regional character, so as to ensure regional level co-ordination of the programming and execution of Unesco's activities.

The regional offices are an integral part of the Secretariat of Unesco as regards their programme and budget, their administrative structure and the composition of their staff. For this reason, there will be no separate chapter about the contribution of these offices to the various matters of concern to Unesco. This report therefore contains a large number of references in various places to the work done by these offices, work which is too considerable to be recapitulated here in its entirety. By way of illustration, it is worth mentioning that the Regional Office for Science and Technology for Latin America and the Caribbean provided during 1979-1980 support to the Member States in the region in their preparations for the United Nations Conference on Science and Technology for Development and as follow-up organized a meeting in 1980 and assisted Member States in their preparations for CASTALAC II Conference. In the implementation of the Organization's programmes and activities in the field of science and technology several regional workshops, meetings, seminars and training programmes are convened on subjects of interest and relevance to the Member

States in the areas of science policy (priority determination in science and technology programmes), popularization of science (science museums), basic, life and earth sciences (chemistry, physics, mathematics, informatics, geology and geophysics, lateritization processes) and interdisciplinary sciences (oceanography, ecology), technological research and higher education (post-graduate education of engineers, solar energy, scientific and industrial metrology, low-cost housing, technician training, etc.), water sciences and biology.

In order to encourage the establishment of regional networks of natural products chemistry, biotechnology, science and technology policy planning, microbiological resources, hydrological resources, S&T information, travel and study grants were awarded to enable scientists from the region to participate in international centres and institutes in chemistry and life sciences as well as to senior engineering teachers, marine scientists, hydrologists, etc.

The office continues to collect, disseminate, synthesize and publish information on various aspects of science and technology activities in the Member States of the region within the framework of the Organization's programmes, and was involved in several surveys and studies undertaken by the Organization in areas such as science policy, engineering sciences, hydrology, marine sciences, ecology, etc.

For operational programmes, the office has been involved in negotiations, planning, formulation, implementation and supervision of national and regional projects financed from extra budgetary sources. Consultant and advisory missions were undertaken by the staff to assist in the formulation of requests for projects in the fields of earth sciences, marine sciences, engineering and environmental sciences. The office continued to collaborate with headquarters and UNDP in the implementation of projects in Barbados (Development of Energy Devices), Brazil (Strengthening Research Institutions, Training in R & D, Science and Technology for Development, Scientific and Technologic Aspects of Energy, Basic Research in Agricultural Chemistry), Chile (Biological Sciences), Colombia (Scientific and Technological Development), Cuba (Marine Pollution), Jamaica (Engineering Department at CAST), Mexico (Instituto de Ciencias del Mar), Trinidad and Tobago (Advisory Services), Uruguay (Marine Sciences) and Venezuela (Formación de ingenieros de producción, University Planning).

ROSTLAC was able to establish and develop contacts among specialists in many countries of Europe and America, with a view to multiplying the effects and bringing in knowledge, experience, information, expertise to the region. ROSTLAC actively collaborated in sponsoring programmes of interest to all the countries of Latin America and the Caribbean. Close co-operation with NGOs, regional institutions and centres, within and outside the region, was established, such as ECLA, ILPES, CINDA, CSUCA, SECAB and several activities were sponsored or jointly undertaken in co-operation with these organizations.

Some examples of the activities of the Regional Office for Science and Technology for Latin America and the Caribbean during 1983-1984 are the preparation and follow-up of the United Nations Conference for Science and Technology for Development, the preparation of CASTALAC II Conference, the provision of support for the activities of the regional networks for basic sciences in the region. This office provided support through contracts for 2 conferences, 4 symposia, 15 seminars, 21 workshops, 14 meetings, 66 training courses, and 3 newsletters (engineering education, oceanographic research, ecology). Some 2000 participants from the region attended

activities sponsored or organized by ROSTLAC in 1983-1984. For these activities ROSTLAC involved experts both from the region as well as from other regions of the world.

ROSTLAC was also able to reach a large number of specialists in many countries in Europe and America, and to multiply the effects of its efforts, through the "networks", or "network-type structures", that have developed in Latin America during recent years, due to a great extent to the efforts of Unesco. These networks, and similar structures, are in operation in the fields of biology, chemistry, the geosciences, seismology, engineering education, mathematics, physics and informatics.

For operational activities, the office assisted in the development of regional projects in water resources management, coastal ecosystems, Andean highlands socioeconomic development and biomass energy.

In the area of studies and surveys, the office assisted studies of requirements for training courses for STP planners, priority determination in science and technology, personal achievements in R & D, cross impact of science, technology and crisis, traditional food technologies.

b) *UNESCO/UNDP Regional Technical Assistance Programme*

Regional or subregional projects supported by UNDP derive from requests submitted by groups of Member States addressed to UNDP and Unesco within the framework of UNDP's regional or interregional programmes. Some examples of this kind of co-operation are given in Table II below.

Table II

Regional/subregional science and technology projects supported by UNDP, and planned for implementation in 1984 or 1985

CODE	TITLE		Total UNDP contribution (in 1.000 UES)
RLA 78 017	Science and Technology Policies	1979-83	225
RLA 78 024	Biological sciences	1978-84	1948
RLA 80 013	Scientific and technological development	1980-83	41
RLA 80 009	Biotechnology	1983-84	14

We would like to add the following: The project RLA/78/024 is now part of the International Biosciences Network and under the Regular Programme of Unesco receives support for travel of participants to training courses as well as for Inter-regional projects. The co-ordinator of the project is a member of the International Steering Committee of IBN and has regular consultations with the Committee concerning activities in Latin America.

c) *Unesco's relations with regional and subregional scientific and professional bodies in Latin America and the Caribbean*

Unesco has established working links with a large number of these bodies. Some of them are intergovernmental such as the Comisión Económica para América Latina (CEPAL); the Banco Interamericano de Desarrollo (BID): the Organización de Estados Americanos (OEA); the Secretaría Ejecutiva Permanente del Convenio Andrés Bello (SECAB); the Junta del Acuerdo de Cartagena (JUNAC); the Asociación Latinoamericana de Integración (ALADI); the Secretaría Permanente del Tratado General de Integración Económica Centroamericana (SIECA); the Sistema Económico Latinoamericano (SELA); the Comisión Regional de Recursos Hidráulicos (CRRH); the Centro Internacional de Formación en Ciencias Ambientales de Países de Habla Española (CIFCA); the Instituto Centroamericano de Investigación Tecnológica Industrial (ICAITI); the Confederación Universitaria Centroamericana (CSUCA); the Unión de Universidades de América Latina (UDUAL); the Asociación Latinoamericana de Energía Solar (ALES); the Organización Latinoamericana de Energía (OLADE); the Centro Latinoamericano de Química (CIAQ); the Centro Regional de Sismología (CERESIS); the Centro de Desarrollo de Ciencia y Tecnología para América Latina (CECTAL); the Centro Regional de Alfabetización Funcional para América Latina (CREFAL); the Centro Regional de Construcciones Escolares para América Latina Región Caribe (CONESCAL); the Facultad Latinoamericana de Ciencias Sociales (FLACSO); the Centro Internacional de Estudios Superiores de Periodismo para América Latina (CIESPAL); the Consejo Latinoamericano de Ciencias Sociales (CLACSO); the Instituto de Estudios Avanzados (INTERMUNDO/IDEA); the Intergovernmental Bureau for Informatics (IBI); the IBI regional centres CREI (Centro Regional de Estudios en Informática) and CREALC (Centro Regional para América Latina y el Caribe); the International Union for Pure Applied Chemistry (IUPAC).

Other bodies are non-governmental, such as: Unión Panamericana de Ingenieros (UPADI); Centro Interamericano de Desarrollo Andino (CINDA); Asociación Interamericana de Radiodifusión (AIR); Centro Latinoamericano de Economía Humana (CLAEH); Centro Latinoamericano para el Desarrollo de la Inteligencia (CELADI); Red Latinoamericana de Información sobre Asentamientos Humanos (LATINAH); Centro Regional de Fomento del Libro para América Latina (CERLAL); Federación Latinoamericana de Sociedades Químicas (FLAQ); Centro Latinoamericano de Estudios en Informática (CLEI); Federación Latinoamericana de Informática (FLAI); Centro de Estudios sobre Enseñanza de la Informática (CESEI); Centro Interamericano de Investigación y Desarrollo (CIID); Association of Geoscientists for International Development (AGID); Asociación Latinoamericana de Investigación Operativa.

3. Activities at national level

When a Member State, an Associate Member or a particular group of states so requests, Unesco can provide assistance for the implementation of projects, programmes or other activities forming part of an operation intended to develop education, science or culture. The funds necessary for this assistance may come from the Organization's regular budget, from extra-budgetary resources like those provided by the United Nations Development Programme (UNDP); United Nations Interim Fund for Science and Technology for Development (IFSTD) or from funds-in-trust provided by the Member States themselves.

a) Unesco's regular programme

Many activities described in this report are financed under Unesco's regular programme. Without going into the detail of all these activities, it is fair to say that they represent a considerable proportion of Unesco's activities aimed at Latin America and the Caribbean Member States, in the field of science and technology.

It should nevertheless be recalled that the activities financed under Unesco's regular programme include those covered by the Programme of Participation in the Activities of Member States. In this instance, the activities are undertaken by the countries themselves with the co-operation of Unesco and frequently take the form of fellowships, travel grants and subventions for the organization of meetings, awarded at the request of the Member States or international organizations concerned.

b) UNESCO/UNDP Technical Assistance Programme

With financial backing from the United Nations Development Programme (UNDP), Unesco is able to provide its Member States and Associate Members in the region at their request, with technical assistance in the fields of science and technology. This is naturally subject to the necessary funds being made available by UNDP. These technical assistance activities form part of the "National UNDP Country Programme".

At the present time, under UNDP country programming arrangements, Unesco is assisting a number of its Member States in Latin America and the Caribbean in many fields of science and technology. A list of current national science and technology projects for development financed by UNDP is given in Table III. Table IV lists current national projects in the field of science, technical and vocational education financed by UNDP, and executed in co-operation with Unesco. It should be mentioned that these two lists are obviously not exhaustive since Member States may request technical assistance from Unesco (experts, fellowships, equipment) in the most varied fields of science and technology under their own UNDP financial technical assistance country programme.

Table III

Current or planned (up to 1984) national science and technology projects for development financed by UNDP, executed in co-operation with Unesco

Country	Project Code	Project Title	Duration	UNDP contribution (in 1000 U$S)
Barbados	Bar 82 001	Development of Energy Devices	3 years	139
Brazil	Bra 76 022	Strengthening Research Institutions	6 years	672
	Bra 76 023	Training in Research and Development	6 years	312
	Bra 82 001	Science & Technology for Development	2 years	600
	Bra 82 004	Scientific and Technologic Aspects of Energy	4 years	861
	Bra 82 023	Basic Research in Agricultural Chemistry	4 years	335
Chile	Chi 81 001	Biological Sciences	3 years	486
Colombia	Col 76 005	Scientific and Technological Development	6 years	946
Cuba	Cub 80 001	Marine Pollution	4 years	974
Mexico	Mex 82 013	Marine Sciences Institute	5 years	378
Trinidad & Tobago	Tri 78 006	Advisory Services	5 years	255
Uruguay	Uru 82 009	Marine Sciences	3 years	282
Venezuela	Ven 77 004	Product Engineering Training	6 years	2373
	Ven 78 014	University Planning	5 years	567

Table IV

Current national projects in Science, Technical and Vocational Education financed by UNDP, executed in co-operation with Unesco

Country	Project Code	Project Title	Duration	UNDP contribution (in 1000 U$S)
Brazil	Bra 82 021	Technology Applied to Education	2 years	161
	Bra 82 022	Development of Graduate Education	5 years	302
Caribbean Islands	Car 83 001	Multi-Islands Education Development Project	2 years	635
Colombia	Col 80 018	Literacy and Adult Education	3 years	300
	Col 82 027	Higher Education	4 years	1550
Cuba	Cub 79 006	Educational Development in Cuba	5 years	394
Dominican Republic	Dom 80 001	Assistance to Education Sector	4 years	469
	Dom 83 102	Population Education	3 years	97
Ecuador	Ecu 79 003	Education sector human resources	5 years	485
El Salvador	ElS 78 007	Educational System Strengthening	5 years	593
Nicaragua	Nic 82 003	Educational System Development	5 years	262
Panama	Pan 82 019	University Development Planning	1 year	28
Peru	Per 79 001	Labour and Professional Training	5 years	646
	Per 81 005	Literacy	2 years	422
Trinidad & Tobago	Tri 82 007	Technical Education Planning	1 year	21

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PART II

DESCRIPTION OF PROGRAMME ACTIVITIES

Section I - Science, technology and society

A. Activities at world level

1. Title: Impact of science on society

Brief description: a quarterly journal published by Unesco in English and French, and issued also in Spanish, Arabic, Chinese, Russian and Korean.

Main aim: to disseminate information and current trends of thought or action about science and/or technology in the contemporary world in relation with its societal impact.

Specific activities: editing, production, distribution and promotion of the journal.

2. Awarding of three science prizes for major contribution to science and to science and technology extension work. These are the Unesco Science Prize, the Kalinga Prize and the Carlos Finlay Prize.

B. Activities at regional level

1. Title: Science and society

Brief description and main aims: within this topic, a number of specific activities have been conducted, aiming at a greater awareness of scientists and technologists, decision makers and the public in general of the social impact of modern science and technology and its relation to development, in particular in key areas such as informatics, biotechnology and applied microbiology and genetic engineering.

Specific activities and achievements: the activities included a Symposium on Epistemology and History of Science, a Regional Meeting on Ethical and Legal Contents of Science and Technology Progress and of International Scientific Cooperation, and workshops on the Popularization of Science by the mass media.

Organization responsible: ROSTLAC

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Section II - Science and technology policies

A. Activities at world level

1. Title: Science and technology policy programme

Principles of action: Unesco's activities in this field are based particularly on the following facts and principles:

(i) a nation's science and technology policy is one of the most dynamic factors in its overall national development and security; and

(ii) support to creative research and experimental development lies at the basis of a nation's self-reliance and fosters endogenous development;

(iii) the rationally planned and innovative application of science and technology enables countries more rapidly to take advantage of recent discoveries and inventions;

(iv) scientific and technological interdependence which is based on judicious transfers of knowledge and know-how and which respects the dignity and the interests of all, contributes in an effective way to the maintenance of peace between the nations.

Main aims and functions: the activities of the Division of Science and Technology Policies can be divided into the following main functional areas:

(i) *Standard-setting and methodological activities* whose purpose is to support -and also to justify- certain norms or methods of action that could usefully be adopted/applied by the Member States and the international community, in the field of policy-making for science and technology.

Examples are:

- the responsibilities and rights of scientific workers, such as described in the Recommendation concerning the Status of Scientific Researchers (as adopted by the General Conference of Unesco at its eighteenth session in 1974) and the extent to which that standard-setting text has found application in the Member States;
- the human values and ethical criteria to be taken into consideration in selecting the objectives of scientific research and experimental development (R&D) at both the national and the international levels;
- the multilingual terminology used in policy-making for science and technology as exemplified by the SPINES Thesaurus, a controlled and structured vocabulary for planning, management and practical application to development, of which English and French versions have been produced (Spanish and Portuguese versions are in preparation; Arab, Russian and Dutch versions are also envisaged). The thesaurus enables the indexing, at the national or international level and in computerized or manual systems of documents dealing with development whether from a scientific and technological or a socio-economic point of view; it also enables the description of ongoing research projects and expert profiles for the use of decision-makers;

- a trilingual glossary (English/French/Spanish) of terms in common usage in science and technology policy;
- planning, programming and budgeting techniques applicable to scientific and technological activities at national level. Examples are the Unesco manuals for establishing national budgets, and for determining priorities in the field of science and technology; and for building up a data base on the national scientific and technological potential.

These standard-setting and methodological activities constitute the intellectual and operational basis for the Organization's technical co-operation with its Member States in the sphere of science and technology policies (see (vii) below).

(ii) *'Forum' activities* designed to enhance international exchange of useful information relating to Member States' policies for science and technology. Examples are the periodical Unesco conferences which bring together the ministers in charge of science and technology policies at the regional level; mention should be made in this connection of the MINESPOL and CAST type conferences, on the application of science and technology to development. The main current activity in this field is the preparation and holding of the second Conference of Ministers Responsible for the Application of Science and Technology to Development and those Responsible for Economic Planning in Latin America and the Caribbean (CASTALAC II), to be held in 1985, and a similar conference in the Arab States.

At government expert level, mechanisms may be established for continuing concertation among the Member States of a given region, the Secretariat of which rests with Unesco; a case in point is the Standing Conference of National Science and Technology Policy-making Bodies for Latin America and the Caribbean which held six sessions since its establishment in 1966.

(iii) *Activities in support of organized scientific and technological co-operation among Member States in a given region.* The growing trend towards close association of countries belonging to the same (sub)region raises the problem of harmonizing or even integrating their national policies in many fields which are normally the sovereign province of the partner governments. Unesco assists these associations of Member States upon request, sometimes with the financial support of UNDP, with a view to speeding up the formulation and implementation of joint science and technology policies for such communities of states. Examples that may be cited in this respect are the West African Economic Community (CEAO), the Convenio Andres Bello (SECAB) for the Andean countries, the Caribbean Council for Science and Technology (CCST) and the Association of Southeast Asian Nations (ASEAN).

(iv) *International comparative studies and research* on contemporary problems of interest to Member States' science and technology policies. The following may be listed among such ongoing activities:

- the international comparative study on the organization and performance of research units (ICSOPRU), in which more than twelve Member States from Asia, the Arab States region, Europe and Latin America have participated;

- the research project on societal utilization of research and experimental development (R&D);
- the construction of meaningful indicators of scientific and especially of technological development, the definition and utilization of which may help improve the selection and assessment of operative technologies;
- the stimulation of national demand for technological progress, i.e. for instance by appropriate reorientation of the states' purchasing power and by the use of fiscal or other techniques aimed at promoting national R&D activities.

(v) *Development and promotion of information exchange for policy-making in the field of science and technology.* This type of activity comprises, *inter alia:*

- the preparation of regional compendia (Africa, Arab States, Asia, Europe, Latin America) on the science and technology policies of Member States; such compendia are normally published on the occasion of the ministers' conferences mentioned under section (ii) above. Detailed national monographs on the same subject are also published at irregular intervals at the request of the Member States concerned;
- maintenance of a data base concerning national science and technology policies;
- the publication of directories on teaching and research units dealing with subjects related to policy-making for science and technology existing in the Member States of Unesco, and on their national science and technology policy-making bodies (Ministries, Federal Councils for Science and Technology, National Research Councils, etc.);
- the setting up of bibliographic and factual data bases at national level in support of policy-making for science and technology: their possible interconnection through the international information system SPINES, proposed by Unesco;
- the publication of more than sixty books and monographs in the Unesco series "Science Policy Studies and Documents" and elsewhere.

(vi) *Training of qualified personnel in the field of planning, organization and management of national science and technology policy.* These activities encompass the following:

- the granting of observation fellowships and study fellowships (about fifteen per year) awarded respectively to high officials and to students wishing to specialize, by means of foreign travel, in questions concerning science and technology policies;
- the organization of national symposia, regional training seminars and summer courses for science policy-makers and research managers;
- the preparation of teaching modules and syllabi for those training courses;
- the publication of a book aimed at a young and informed readership, on the life and work of scientific researchers;
- the publication of an "Introduction to policy analysis in science and technology", No. 46 in the series "Science Policy Studies and Documents", for specialized readers.

(vii) *Advisory services to Member States* for the formulation and implementation of national science and technology policies for development. Unesco's technical co-operation may bear, as the case may be and according to the requests received from the Member States concerned:

- the design, establishment and functioning of science and technology policy-making machinery;
- the preparation of scientific and technological development plans and budgets consonant with the overall development plans of the countries concerned;
- survey and analysis of the national scientific and technological potential;
- the identification of priorities for the national R&D system and related scientific services, and evaluation of their level of performance and effectiveness;
- development of the countries' institutional base for science and technology through systematic assessment of the needs linked with national development goals and with existing obstacles;
- the identification and formulation of projects which meet those needs, with a view to securing their long-term financing from extra-budgetary sources;
- the improvement of laws and regulations governing the working conditions of scientific researchers.

Approximately two hundred advisory missions of this kind have been carried out over the past seventeen years, followed by reports and recommendations for action addressed to the governments concerned. Such technical co-operation extended by Unesco to its Member States is at present financed out of the Organization's regular budget, and also under the United Nations Development Programme (UNDP), the United Nations Financing System for Science and Technology (UNFSSTD), and under funds-in-trust agreements.

(viii) *Co-operation* with non-governmental organizations active in the field of science and technology policy. For example:

- the International Council for Science Policy Studies (IUHPS/ICSU);
- the Research Committee on "Science and Politics" of the International Political Science Association (IPSA);
- the Science Policy Committee of the World Federation of Scientific Workers;
- the ICSU Committee on the Safeguard of the Pursuit of Science.

(ix) *The setting up of international or regional instruments or mechanisms for the financing of scientific and technological development of Member States.* An important feature of Unesco's Science and Technology Policies Programme concerns the *financing* of research programmes and projects of developing countries, in the field of science and technology. Illustrative examples of these activities are the establishement of the Unesco Special Fund for Research and Experimental Development (R&D) in Africa and the drawing up of an integrated programme for the scientific and technological development of the Caribbean region.

(x) *Participation in the formulation of a harmonized and gradually integrated science and technology policy for the organizations belonging to the United Nations system.* This implies a close collaboration on the part of Unesco, with the United Nations Intergovernmental Committee on Science and Technology for Development, its Advisory Committee (UNSTAC) and with the United Nations Centre for Science and Technology for Development (UNCSTD).

Principal achievements:

(i) Organization of Regional Conferences of Ministers responsible for the Application of Science and Technology to Development:

1965 CASTALAC Latin America (Santiago, Chile);
1968 CASTASIA Asia (New Delhi, India);
1970 MINESPOL Europe (Paris, France);
1974 CASTAFRICA Africa (Dakar, Senegal);
1976 CASTARAB Arab States (Rabat, Morocco);
1978 MINESPOL II (Belgrade, Yugoslavia);
1982 CASTASIA II (Manila, Philippines);
Preparation of CASTARAB II to be held in 1985
Preparation of CASTALAC II to be held in 1985.

(ii) Establishment with Unesco's assistance, of governmental organizations for science and technology policy-making in more than 20 Member States.

(iii) Submission of more than 160 Expert reports (since 1969) to the governments of Member States on problems concerning national policies in the field of science and technology.

(iv) Adoption by the eighteenth session of Unesco's General Conference of the Recommendation on the Status of Scientific Researchers (1974).

(v) Publication of sixty volumes (since 1965), in the series "Science Policy Studies and Documents";
Publication of "Science for Development" (Unesco, 1971);
Publication of "Scientific productivity - the effectiveness of research groups in six countries" (Cambridge University Press, Unesco 1979).

Background information:

Programmes launched in 1960 (11C/Resolution 2.113/b);
19C/Resolutions 2.121, 2.122 and 2.123;
20C/Resolutions 2/4.2 and 2/10.1;
21C/Resolutions 2/01/4.2;
Unesco's Medium-Term Plan for 1977-1982, objective 4.2;
Unesco's Approved Programme and Budget for 1984-1985 22C/5, Programme IX.2;
Unesco's Medium-Term Plan for 1984-1989 Programme IX.2.

Organizations responsible:

Unesco, in collaboration with certain international non-governmental organizations. In addition, Unesco's programme on science and technology policy takes fully into consideration the resolutions adopted in this field by the General Assembly of the United Nations, by the United Nations inter-governmental Committee on Science and Technology for Development and by the United Nations Conference on Science and Technology for Development (UNCSTD, Vienna, 1979).

Organizational machinery:

Unesco's General Conference, Executive Board and Secretariat.

Participants

All Member States of Unesco, and in particular, the national bodies responsible for science and technology policy.

B. Activities at regional level

1. Title: Promotion of science and technology policies in the Latin America and the Caribbean region.

Principles of action and main aims: regional conferences of ministers and other regional meetings are convened with the following objectives in mind:

- to allow for international comparisons and periodic assessment by Member States collectively at the regional level, of the current trends in their national science and technology policies;
- to allow for thorough discussions of current problems of common interest to policy-makers in science and technology of the region concerned;
- to allow Member States to exchange information on national science and technology policies aimed at solving of their development problems;
- to evaluate results and devise a strategy of regional co-operation in priority fields of science and technology;
- to strengthen the capability of Member States in the region in formulating and implementing science and technology policies with a view to applying science and technology to the solution of their national development problems;
- to provide information and policy guidance to potential partners in co-operation and aid-giving agencies;
- to promote a systematic orientation on international co-operative research activities towards the solution of world problems.

Specific activities and achievements: the holding of regional meetings and conferences and implementation of the recommendations adopted. As far as these conferences and meetings are concerned, particular mention should be made of the following:

- CASTALAC, Ministerial Conference on the Application of Science and Technology to the Development of Latin America (held in Santiago in 1965);
- Meetings of the Standing Conference of Directors of National Bodies of Science and Technology Policy of Member States in Latin America and the Caribbean (held in Buenos Aires in 1966, in Caracas in 1968, in Santiago de Chile in 1971, in Mexico in 1974, in Quito in 1978, in La Paz in 1981);

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Section III - Scientific research and higher education

A. Activities at world level

The activities under this programme are designed both to contribute to the strengthening of national research and training programmes in the basic sciences and to promote their advancement by developing and broadening international co-operation.

For this purpose, co-operation is maintained with International Non-Governmental Organizations such as the International Council of Scientific Unions, ICSU, and various of its committees, in particular the Committee on the Teaching of Science, CTS, and the Committee of Science and Technology in Developing Countries, COSTED, with the International Centre for Pure and Applied Mathematics (ICPAM), the International Centre for Mechanical Sciences (ICMS), the International Institute for Applied System Analysis (IIASA), the International Centre for Theoretical Physics (ICTP), the International Union of Pure and Applied Physics (IUPAP), the International Union of Pure and Applied Chemistry (IUPAC), the International Organization for Chemistry for Development (IOCD), the International Cell Research Organization (ICRO), the International Brain Research Organization (IBRO), have been employed to promote activities in Latin America and the Caribbean such as:

- research seminars in applied physics related to microelectronics and solar energy conversion;
- regional network for research in chemistry of natural organic products;
- research seminars in neurobiology;
- MIRCEN network in environmental applied microbiological and biotechnological research.

B. Activities at regional level

1. Title: Regional network in the chemistry of natural products

Brief description and principles of action: the regional network has been designed for purposes of promoting the applications of the chemistry of natural products with a view to catalysing research, training and development in the region.

Main aims: to promote and foster the development of research and training programmes and the strenghtening of research units working on the chemistry of natural products. To assist in expanding the exchange of knowledge and the scope of research in selected fields through:

(i) stimulation of the co-operation between research institutes at national and regional level;

(ii) exchange of scientists among the countries in the region;

(iii) organization of regional training courses, seminars, symposia and workshops;

(iv) setting up of regional research teams for solving specific problems in selected fields of importance for the economic development of the region;

(v) evaluation of the social and economic consequences of the application of the research results including environment impact.

Specific activities and achievements: training courses, symposia, travel grants, circulation of newsletter, etc.

Organizations responsible: Unesco, Regional Office for Science and Technology for Latin America and the Caribbean, ROSTLAC, Latin American Phytochemical Society, national and subregional focal points.

Participating countries: open to all Latin American and Caribbean countries.

2. Title: MIRCEN network in environmental, applied microbiological and biotechnological research

Brief description and main aims: the MIRCEN programme embodies activities that are carried out within the framework of Unesco's regular project activities in co-operation with ICRO, IOBB, WFCC and other bodies and the UNEP/UNESCO project on the use and preservation of microbial strains for deployment in environmental management.

A worldwide programme for preserving microbial gene pools and making them accessible to the developing countries has been launched through the establishment of a world network of Microbiological Resources Centres (MIRCENs) which are designed to:

(i) provide the infrastructure for a world network which would incorporate regional and interregional co-operating laboratories geared to the management, distribution and utilization of the microbial gene pool;

(ii) reinforce efforts relating to the conservation of microorganisms, with emphasis on Rhizobium gene pools, in developing countries with an agrarian base;

(iii) foster the development of new inexpensive technologies native to the region;

(iv) promote the applications of microbiology in order to strengthen rural economies; and

(v) serve as focal centres for the training of manpower and the diffusion of microbiological knowledge.

Specific activities and achievements: collection, identification, maintenance, testing and distribution of rhizobial cultures compatible with crops of the region. Identification of problems pertinent to the deployment of local rhizobia inoculant technology and promotion of research are other activities.

Advice and research guidance to individuals and institutions engaged in rhizobiology research. Short and long-term training in the development of scientific and technical manpower required for the use of rhizobial inoculants. Dissemination of information in the region to agricultural extension workers and microbiologists, through bulletins, newsletters and demonstrations.

Organizations responsible: MIRCEN Guatemala, MIRCEN Porto Alegre (Brazil).

Participating countries: open to all Latin American and Caribbean countries.

3. Title: Strengthening of national research potential improvement of infrastructures and regional co-operation in basic sciences.

Brief description and principles of action: in each of the basic sciences, Mathematics, Physics, Chemistry and Biology, Unesco has supported a continuous line of activities such as training courses, symposia, congresses, travel grants, exchange of information, in collaboration with pertinent regional bodies:

(i) Mathematics: Unesco has continued to support the Latin American Centre for Mathematics and Informatics (CLAMI) and its activities;

(ii) Physics: Unesco has continued to support the Latin American Centre of Physics (CLAF) and its activities, as well as the periodically held Latin American Schools of Physics (ELAF). In recent years Unesco has also supported the emerging initiatives of the Association for the International Physics Centre (ACIF) in Colombia and MULTICIENCIAS in Peru.

(iii) Chemistry: Unesco's support has focussed on a number of lines which include the following:

- production of low-cost equipment for teaching at the secondary and university levels;
- improvement of university laboratory courses;
- university-industry co-operation in Chemistry;
- analysis of residual pesticides;
- theoretical Chemistry.

(iv) Biology: Unesco has continued to support the Latin American Centre for Biology (CLAB) and its activities.

Organizations responsible: CLAMI, CLAF, CLAB, and Unesco's Regional Office for Science and Technology for Latin America and the Caribbean, ROSTLAC.

Participating countries: open to all Latin American and Caribbean countries.

4. Title: Development of a regional co-operation structure in Informatics.

Principle of action and main aims: the main aims of this programme are:

(i) to strengthen the exchange and co-operation in training of human resources in Informatics at university level;

(ii) to develop a regional structure consisting of specialized institutions in Informatics which would serve as basis for the dissemination of information in the region, and

(iii) to develop within the framework of item (ii) specific activities contributing to the promotion and strengthening of regional co-operation in different fields of application such as congresses, seminars, courses, exchange of specialists, applied and research projects, etc.

Specific activities at regional level: a regional co-operative network among institutions related with Informatics (RCII network) was established. At present, the network consists of more than 60 institutions from Argentina, Bolivia, Brazil, Colombia, Costa Rica, Chile, Dominican Republic, Ecuador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. The following are the specific activities carried out during the period 1981-1983:

- Study on the Latin America university curricula in Informatics, Latin American Study Centre on Informatics, CLEI.
- Establishment of a Documentation Centre on Informatics Training at Primary Level, Latin American Mathematics and Informatics Centre, CLAMI.
- Preparation of a Directory of Specialists in Informatics, Latin American Informatics School, EII.
- Establishment and support to the Training and Informatics Study Centre, CESEI, Peru.
- Support to more than 40 different events, seminars, courses and conferences.

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Section IV - Technological research and higher education

A. Activities at world level

1. Title: Promotion of international co-operation in research and training in priority fields of the engineering sciences.

Principles of action: to carry out co-operative international activities in priority fields such as low-cost housing, rational use of energy, applications of modern engineering methods and metrology, through manuals, training courses, exhibitions and demonstration projects.

Main aims: to promote the development of endogenous technologies and to disseminate information on innovative approaches in the application of engineering sciences to development.

Specific activities: preparation of training manuals, training of monitors, formation of working groups to develop and evaluate training materials, preparation of exhibitions, study tours, provision of consultants, support to pilot projects.

Background information: 21 C/5 Resolution 2/01

Organizations responsible: Unesco, in co-operation with non-governmental organizations, notably the Union of International Technical Associations (UATI), the World Federation of Engineering Organizations (WFEO), the International Council of Scientific Unions (ICSU) and the Commonwealth Science Council (CSC).

Participating countries: all Member States.

2. Title: Improvement of the training of engineers and technicians

Principles of action: concentration on priority areas such as curricula design, technician training, continuing education, education-industry co-operating, environmental aspects of engineering education, women's participation in engineering education.

Main aims: to improve the quality and relevance of the education of engineers. To promote the education and training of technicians. To further develop the programme of post-graduate courses for training engineering research workers.

Specific activities: preparation of guides, publications and brochures on engineering education. Support to non-governmental organizations for newsletters and specific activities in priority areas. Training seminars for engineering professors

and technician teachers. Studies and publications on the roles and status of technicians. Adaptation of training materials to meet specific needs of developing countries. Exchange visits with inter-institutional links. Advisory missions of staff or consultants.

Organizations responsible: Unesco, in co-operation with ILO, UNIDO and international and regional non-governmental organizations.

Participating countries: all Unesco Member States

3. Title: Promotion of research and experimental development aiming at national utilization of conventional and non-conventional sources of energy. Development of information systems and renewable sources of energy.

Principles of action: co-operation with other organizations of the United Nations system and with non-governmental organizations in establishing international co-operative programmes and linkages. Emphasis is placed on training and on improving information flow, the latter through strengthening energy information infrastructures at the national level enabling participation in regional networks which will be linked into a world network of energy information.

Main aims: to assist Member States in research and development in new sources of energy, especially new and renewable sources and those for rural and dispersed populations, and to sensitize Member States to adopt new and renewable energy technologies in the best interest of development.

Specific activities: training workshops, courses and demonstration projects. Preparation of training materials and brochures. Exchanges of personnel, study visits. Organization of meetings on energy problems, regional pilot projects on energy information, document delivery systems, energy data collection, processing, analysis and dissemination systems.

Background information:

+20 C/S Resolution 2/01
+ Results of the United Nations Conference on New and Renewable Sources of Energy, Nairobi, August 1981.
+ A preliminary study on an international information system relating to new and renewable energy resources (Unesco 21 C/INF 10, 8 October 1980).

Organizations responsible: Unesco, in close co-operation with other organizations of the United Nations system and with other intergovernmental bodies and with non-governmental organizations.

Participating countries: all Unesco Member States

B. Activities at regional level

1. Title: Regional co-operation in technological research and higher education.

Principles of action: concentration on fields of priority importance for the region. Close co-operation with other governmental and non-governmental organizations in all activities.

Main aims: to encourage research and development in various branches of technology and engineering, in order to contribute to solving problems of regional importance. To strengthen regional and national infrastructures and institutions for education and training of engineers and technicians.

Specific activities: preparation of a Regional Project for a coordinated system of roving standards for measures in Latin America in collaboration with SIM (Sistema Interamericano de Metrología). Distribution of a mini-library in the field of appropriate technology in Spanish. Support for the organization of events on endogenous technologies.

Organization responsible: ROSTLAC in co-operation with regional non-governmental organizations.

Participating countries: Unesco Member States of Latin America and the Caribbean.

2. Title: Improvement of the training of engineers and technicians in the region.

Principles of action: new methods in engineering education, adapted to the conditions of the region, creation and regional co-operation of engineering education centres, directories, women's participation in engineering education.

Main aims: improvement of the quality of engineering education in the region, stimulation of research and regional co-operation in this field.

Specific activities: organization of seminars on new methods in engineering education in collaboration with UPADI. Support to Engineering Education Centres. Support to regional co-operation in design and construction of didactic materials. Publications on the subject.

Organization responsible: ROSTLAC in co-operation with regional non-governmental organizations.

Participating countries: Unesco Member States of Latin America and the Caribbean.

3. Title: Promotion of research and experimental development aiming at the utilization of conventional and non-conventional sources of energy in the region. Development of a regional information system on new and renewable sources of energy.

Principles of action: demonstration and research projects in new and renewable sources of energy, bioenergy, energy planning methodology, regional energy information system.

Main aims: encourage research in utilization, adaptation of new and renewable energy technologies for rural areas. Support efforts done to improve education and research in energy planning in the region. Establish a regional system for energy information.

Specific activities: Latin American Energy Information System (SIELA). In collaboration with OLADE. Workshops on energy planning methodologies. Workshops on new and renewable energies. Support to research and demonstration projects in bioenergy. Regional Pilot Project for Energy Information Networking in Latin America (at OLADE)

Organization responsible: ROSTLAC in co-operation with regional non-governmental organizations.

Participating countries: Unesco Member States of Latin America and the Caribbean.

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Section V - Ecological sciences

A. Activities at world and regional level

1. Title: Man and the Biosphere Programme (MAB)

Principles of action and background: The main objective of MAB is to provide the scientific basis for the long-term use and conservation of natural resources to enable mankind to manage the natural resources of the biosphere more efficiently. To this end, the programme consists of networks of interdisciplinary field research and training activities in order to study and understand better the impact of man on the environment but also the impact of the environment on man, considered as a biological and adaptive entity and as a social, cultural and economic being. Such studies depend on close co-operation between natural and social scientists in the field, as well as among the scientific community, planners, managers and decision makers and local populations. MAB is engaged in supplying the scientific information needed to overcome the practical problems of natural resources management, including both exploitation and conservation, which are considered as having priority by populations, planners and scientists alike, who have to deal with them daily on the spot. The programme therefore gives pride of place to action and experimental work in the field based on the simplest possible principles and practical arrangements. It sets out to provide decision-makers with scientific advice that is sound and clear enough for them to be able to select, in the light of all the factors involved, a course of action which will be appropriate to the problems faced. The programme must be implemented with the utmost flexibility so as to cater for the changing needs and emergent priorities of the countries concerned.

MAB is a decentralized programme, promoted by Unesco in all its fields of activity, operating through a framework of National Committees which co-ordinate its activities. Established so far in 102 countries, these committees usually comprise scientists from universities or national research institutions and representatives of other public or private bodies, concerned with environmental research and management.

In September 1984, among Unesco's thirty three Member States and three Associate Members in the Latin American and Caribbean region, fourteen countries have set up a MAB national committee. The other countries receive information either through focal points of the Unesco National Commissions. Some of these committees are in the process of being reorganized or restructured in order to better respond to the evolution and aims of the MAB Programme, particularly in terms of seeking the active participation of decision-makers, planners, managers, as well as educators, trainers, and the broad public. It is through the integration of these levels that research and training activities will become more meaningful for the practical solution of problems of management and conservation of natural resources and land use.

The International Co-ordinating Council, comprising 30 members elected by the General Conference of Unesco from among representatives of the Organization's Member States, is the main policy-making body of MAB. It meets every two years to review and assess progress being made in implementing the programme. A small Secretariat of Unesco staff members ensures overall co-ordination at the international level.

At present, Chile, Colombia, Cuba and Guyana are the countries from the region represented at the MAB Council.

MAB was officially launched in 1970 at the sixteenth session of the General Conference of Unesco and the broad outlines of the programme were established in November 1971 at the first session of the MAB International Co-ordinating Council which proposed thirteen project areas for co-operative research. A fourteenth project, on environmental pollution, was added at the eighteenth session of the General Conference in 1974. In Unesco's Medium-Term Plan for 1977-1982, objectives 7.2, 7.5, 7.6 and 7.7 cover the various aspects and activities of the MAB programme which corresponds to 19 C/Resolutions 2.151, 2.152 and 20 C/Resolutions 2/7.2/1, 2.7/5.1, 2/7.6/1 and 2/7.7/1.

Specific activities: The MAB programme includes the following fourteen major research themes:

MAB Project 1 - Ecological effects of increasing human activities on tropical and subtropical forest ecosystems. Emphasis on Costa Rica, Mexico, Peru and Venezuela.

MAB Project 2 - Ecological effects of different land uses and management practices on temperate and mediterranean forest landscapes; Argentina, Chile.

MAB Project 3 - Impact of human activities and land use practices on grazing lands; savannah and grassland (from temperate to arid areas); Argentina, Chile,Mexico.

MAB Project 4 - Impact of human activities on the dynamics of arid and semi-arid zones ecosystems, with particular attention to the effects of irrigation.

MAB Project 5 - Ecological effects of human activities on the value and resources of lakes, marshes, rivers, deltas, estuaries and coastal zones; Chile, Nicaragua, Uruguay.

MAB Project 6 - Impact of human activities on mountain and tundra ecosystems; Argentina; Bolivia, Chile, Peru; Ecuador, Colombia and Venezuela.

MAB Project 7 - Ecology and rational use of island ecosystems; Cuba, Ecuador.

MAB Project 8 - Conservation of natural areas and of the genetic material they contain; Argentina, Bolivia, Chile, Colombia, Ecuador, Honduras, Mexico, Panama, Peru, Venezuela.

MAB Project 9 - Ecological assessment of pest management and fertilizer use of terrestrial and aquatic ecosystems. (Not implemented).

MAB Project 10 - Effects on man and his environment of major engineering works; Argentina, Uruguay.

MAB Project 11 - Ecological aspects of urban systems with particular emphasis on energy utilization; Argentina, Brazil, Mexico, Paraguay, Uruguay.

MAB Project 12 - Interactions between environmental transformations and the adaptive, demographic and genetic structure of human populations; Chile.

MAB Project 13 - Perception of environmental quality; Mexico (1 regional meeting in Uruguay).

MAB Project 14 - Research on environmental pollution and its effect on the biosphere. (No activities in the region yet, possibly Chile will start some actions).

To strengthen the research programme, MAB includes among its objectives the training of scientists and technicians willing and able to participate in multidisciplinary research teams. This is achieved by means of international and regional training courses, fellowships and exchange of personnel with special emphasis on on-site training in places where MAB projects are already in.

Priorities within the specific activities with indication of their regional level

As part of its evolution and upon recommendations of Member States which form part of the International Co-ordinating Council of MAB, the Programme has concentrated its activities in 4 themes recognized as priority areas by Unesco. These are: 1) tropical and sub-tropical forest ecosystems; 2) arid and semi-arid lands, and other marginal lands such as mountain ecosystems; 3) urban systems and other human settlements, and 4) conservation of natural areas and the genetic material they contain. These priority themes have acquired great importance on account of the fragility of the ecosystems involved and the urgent need to manage rationally and to conserve natural resources for the benefit of man.

Research and management of tropical and sub-tropical ecosystems

Latin American and Caribbean countries have played a pioneer role in the development of research, training and information activities in this theme. In fact, the first MAB training course which dealt with the ecology of tropical forest ecosystems was held in the Venezuelan Institute for Scientific Research (IVIC) in Caracas in 1973. The first panel of experts convened to define the theme of this project area met in Rio de Janeiro in 1974 and a regional meeting to define research priorities and management strategies met in Mexico City in 1975. Since MAB's early days several key institutions in the region have been identified as focal points for activities: the National Institute for Biotic Research (INIREB) in Mexico, IVIC in Caracas, the National Office for the Evaluation of National Resources (ONERN) in Lima and others. All these activities have resulted in a rich output of information and documentation.

Major concerns within these project areas have ranged from studies on the structure and functioning of tropical forest ecosystems, including studies on

nutrient cycling, biological productivity of soils, to the management of wildlife and traditional forms of food production such as the Mexican chinampas system, slash and burn cultivation, integrated farming, etc.

These field research project have become the focal point for exchange of information and people, including "in situ" training as well as for bilateral and multilateral co-operation. UNEP has closely collaborated with MAB in the development of the existing network projects and the present concentration into the important topic of soil biological productivity.

Research and management of arid and semi-arid lands, mountain systems and other marginal lands

In view of the increasing demographic pressure on arid and semi-arid lands and the consequent problems of land degradation, decrease of natural resources, desertification and other problems, several countries of the region have placed this project area as a priority activity in the MAB Programme. Accordingly participating research institutions are emphasizing management and conservation of grazing lands under these conditions: conditions of increasing human intervention and the consequences of desertification. A great diversity of ecological sites have been included in a network of field studies ranging from the Chihuahuan and Sonoran deserts through the high paramos in the Northern Andes and the high plateaux in the Central Andes to the Chaco ecosystem and the grazing lands in the Southern Andes among others. Attention has been focussed on the critical problems caused by the successive depredation of the vegetation by goats and for fuel use, and specific research areas have been centralized on improving the productivity of these marginal lands as in the case of the improvement of the management of forage plants, such as cactae and shrubs. Some of the important research has taken place in areas designated as biosphere reserves. Such research aims at providing a basis for sustained productivity of these areas in order to prevent both further land degradation and the exodus of the rural population. This MAB theme has also included the study of mountain ecosystems, particularly in the Southern and Central Andes and the extra-Andean mountains, all of them subject to different pressures such as grazing, agriculture, mining, tourism, and urbanization. State of knowledge reports have been produced on these mountain regions. Particular institutions such as the Institute of Ecology (Mexico), ONERN, in Peru, the University of Chile, and others which conduct the field projects have served as focal points for meetings and training activities with an important output which has greatly enriched knowledge and understanding of such fragile and critical ecosystems, as a basis for planning and management. They have also been the focal point for inter-agency co-operation such as with UNEP, FAO and OAS: and for bilateral and multilateral co-operation with industrialized countries in Europe and North America.

Conservation of natural areas and the genetic material they contain

As a major activity within this priority theme, an integrated network of protected areas called biosphere reserves has been established under the MAB programme.

Conservation is one of the major objectives of biosphere reserves, reflecting an integrated concept under which all the species composing the ecosystems of a reserve must be preserved.

A biosphere reserve contains both natural areas and areas modified by human activity. Thus there is an untouched "core" area and a "buffer" zone where both practical work and experiments are carried out.

Long-term research is being undertaken in biosphere reserves on the structure, functioning and dynamics of ecosystems and on comparisons between ecosystems, thereby providing baseline data for other MAB research projects. Training, popularization and information exchange activities also take place in these reserves.

Biosphere reserves are selected not for their uniqueness but because they are representative of particular ecosystem types. All the ecosystems and biogeographical provinces of the world are being systematically covered. At the end of 1984, 243 sites in 65 countries had been designated as biosphere reserves.

The creation of a biosphere reserve in no way affects the sovereignty of any State. Indeed the countries themselves propose the sites. Proposals are considered by the MAB Bureau and, if accepted are included in the international network of biosphere reserves.

Ecological studies of urban systems as a basis for planning and decision making

It is a well known fact that Latin America is experiencing a spectacular rate of urbanization which accounts for the fact that at the beginning of the 21st century several of the largest cities in the world will be found in the region. The MAB Programme is responding to the urgent need to look at cities as complex human systems as well as to their relationship with their hinterland proximate and far, attempting to minimize their environmental and social impact and at the same time to make them more productive and efficient through improved planning and management.

Special concern is shown for the use, recycling and conservation of energy and materials, particularly water, and for the solution of land use problems in connection with urbanization and industrialization. The field studies also include concern about the causes and effects of human migration, food production and alternative energy production in and around cities, the role and management of green spaces and public participation.

A number of sites have been incorporated into the global network of MAB field projects initiated in the early 1970's. These include Mexico City, Ciudad Guayana in Venezuela, São Paulo and Porto Alegre in Brazil, Asuncion in Paraguay, La Plata in Argentina, and others, thus covering a vast range of ecological,social and economic conditions.

OTHER AREAS OF INTEREST

Apart from the priority themes outlined above, other project areas are gaining an increasing interest in the region, in some cases being closely associated to these major themes, exemplified as follows:

MAB Project area N: 5 on inland waters and coastal zones

A considerable body of work has been performed in the Southern Cone, mostly in lakes and reservoirs, often in association with other MAB research groups such as on mountain ecosystems. Research has dealt from the ecology characterization of such bodies of water to the effects of human intervention and the fish production.

Perception of environmental quality

MAB Project area 13. In April 1984, this important MAB subject was introduced to researchers and administrators of the region through a Seminar, by the Unesco Regional Office for Science and Technology for Latin America and the Caribbean, to which outstanding European and North American scientists in this field were invited to present both conceptual and methodological approaches and training applied to field strategies for land and resource management.

It was recognized that perception studies can greatly help to better understand how the local population and other actors feel and perceive their environment and changes can be used as a tool to promote the participation of local communities in the solution of environmental problems.

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Section VI - Earth sciences

A. Activities at world level

1. Title: International Geological Correlation Programme

Brief description: the programme is a co-operative effort between the International Union of Geological Sciences (IUGS) and Unesco, designated to encourage international research on geological problems related to the identification and assessment of natural resources and the improvement of man's environment.

It is a multinational, multidisciplinary programme that now (1984) includes 65 research projects which are distributed in Programme Division 1 (Time and Stratigraphy), Division 2 (Major Geological Events in Time and Space), Division 3 (Distribution of Mineral Deposits in Space and Time and Relation of the Processes of Ore Formation to Other Events in Earth History) and Division 4 (Quantitative Methods and Data Processing in Geological Correlations).

Principles of action: to carry out internationally co-ordinated research on selected topics (projects) related to the above-mentioned domains, to exchange scientific information and experience, to train young specialists, especially from developing countries, through project working group meetings, workshops, seminars and symposia.

Main aims:

(i) to assist in obtaining answers to interrelated theoretical and practical problems in the geological sciences, through international cooperation;

(ii) to help locate, through improved geological knowledge and prospecting methods, new mineral and energy resources;

(iii) to develop worldwide standards and nomenclature for defining the relationship between rock units and geological time;

(iv) to define and geographically broaden the application of new research tools and methods to help solve fundamental problems in geological correlation.

The programme has come to have a strong emphasis on the transfer of scientific knowledge and research techniques to developing countries.

Specific activities and achievements:

(i) scientific meetings of project working groups, workshops and seminars, which are being most successfully organized by IGCP project leaders, are constantly encouraged and supported as effective mechanisms for the dissemination of new scientific information and techniques and for training. With Unesco's financial support, forty-seven meetings, seminars and workshops have been organized in various parts of the world in 1984. A similar magnitude of activity is planned for the next years of the Biennium.

(ii) the considerable effectiveness of the programme is proved by the constant flow of scientific publications resulting from or related to IGCP projects. In 1984 some 1000 items have been published.

Current information about the programme and projects is published in the series "Geological Correlation" and in the quarterly journals "Nature and Resources" and "Episodes" (of IUGS).

Background information: in November 1966, the Unesco General Conference supported geological correlation as a key element of its earth science programme. In October 1967, the principle and statutes of the programme were elaborated by the IUGS/UNESCO Ad Hoc Committee in Prague. The scientific content of the programme and ways and means of carrying it out were developed by a meeting of experts in Budapest in 1969. On the basis of a report of the Intergovernmental Conference of Experts for Preparing an International Geological Correlation Programme, held in October 1971 and its recommendations (document 17 C/66), the General Conference of Unesco approved the programme at its seventeenth session in November 1972 (resolution 2.313).

Organizations responsible: the programme is a joint enterprise of Unesco and the International Union of Geological Sciences (IUGS).

Organizational machinery: the development and management of the programme are the responsibility of the IGCP Board which draws on the evaluations and recommendations of the Scientific Committee. Three Board members out fifteen have been appointed from the region, as well as three scientists out of twenty on the Scientific Committee. The co-ordination of the programme and maintenance of liaison with national and international bodies concerned with the IGCP are ensured by the IGCP secretariat which also acts as a secretariat for the IGCP Board and as a receiving Office, clearing house and distribution centre for all IGCP matters.

Participating countries: There are at present eighty National Committees for the IGCP and 23 official contacts, bringing the total number of Member States involved in the programme to 113 including 19 countries from Latin America and the Caribbean.

Scientists from the region participate in some of the thirty-five on-going projects:

Project 29 - Precambrian-Cambrian boundary
Project 41 - Neogene-Quaternary boundary
Project 42 - Upper Paleozoic of South Africa and its boundaries
Project 44 - Lower Paleozoic of South America
Project 58 - Mid-Cretaceous events
Project 61 - Sea-level movements during the last deglacial hemicycle
Project 91 - Metallogeny of the Precambrian
Project 108/144 - Precambrian of West Africa and its correlation with Eastern Brazil
Project 111 - Genesis of manganese ore deposits
Project 114 - Biostratigraphic datum-planes of the Pacific Neogene
Project 120 - Magmatic evolution of the Andes

Project 128 - Late Cenozoic magnetostratigraphy (*)
Project 129 - Lateritization processes
Project 143 - Remote sensing and mineral exploration
Project 146 - River flood and lake-level changes
Project 148 - Quantitative stratigraphic colleration techniques
Project 154 - Global exchange and processing of information in geochemistry
Project 156 - Phosphorites
Project 157 - Early organic evolution and mineral and energy resources
Project 160 - Precambrian exogenic processes
Project 161 - Sulphide deposits in mafic and ultramafic rocks
Project 163 - Design and generation of a world data base for igneous petrology
Project 166 - Correlation of coal-bearing formations
Project 171 - Circum-Pacific Jurassic
Project 174 - Geological events at the Eocene-Oligocene boundary
Project 179 - Stratigraphic methods as applied to the Proterozoic record
Project 183 - West African Mesozoic and Cenozoic correlations
Project 184 - Paleohydrology of low latitude deserts
Project 187 - Siliceous deposits
Project 191 - Cretaceous paleoclimatology
Project 192 - Cambro-Ordovician development in Latin America
Project 193 - Siluro-Devonian of Latin America

2. Title: Feasibility study on the creation of international experimental sites for earthquake prediction research.

Brief description: selection of experimental sites throughout the world and define techniques for the experiments.

Principles of action: investigation of the desirable geotectonic conditions for the experimental sites and approach to possible host governments.

Main aims: provide a situation for a broad participation by different teams studying in earthquake prediction area.

Specific activities and achievements: advisory missions and working group meetings.

Background information: a recommendation on international experimental sites for research on earthquake prediction was made by the Panel of Experts on the Scientific, Social and Economic Aspects of Earthquake Prediction held in 1979. The proposal was approved by the twenty-first session of the General Conference of Unesco.

(*) IGCP Project "On Extended Term" (O.E.T.)

B. Activities at regional level

1. Title: Post-graduate training course on Metallogeny.

Brief description: introduction of advanced knowledge and techniques in mineral resources.

Principles of action: high level transfer of knowledge

Organizations responsible: Universidad Central of Ecuador with ROSTLAC's financial support.

Participating countries: Open to all Latin American and Caribbean countries.

2. Title: Course on photointerpretation applied to geology and civil engineering

Brief description: Techniques of aerial photography applied to geology and civil engineering.

Principles of action: Transfer of knowledge

Organizations responsible: CIAF (Centro Interamericano de Fotointerpretación) with ROSTLAC's financial support.

Participating countries: Open to all Latin American and Caribbean countries.

3. Title: Course on seismic engineering

Brief description. To improve participant's knowledge in seismic engineering.

Principles of action: Transfer of knowledge

Organizations responsible: UNAM (Universidad Nacional Autónoma de México) with ROSTLAC's financial support.

Participating countries: Open to all Latin American and Caribbean countries.

4. Title: OLADE/UNESCO training courses on geothermics (geophysics, drilling and geovulcanology)

Brief description: To improve participants' knowledge and techniques for the development of geothermal engineering.

Principles of action: Transfer of know-how.

Organizations responsible: UNAM (Universidad Nacional Autónoma de México), Universidad de Manizales (Colombia), Universidad Central de Ecuador, in drilling, geophysics and geovulcanology respectively, with OLADE and ROSTLAC's financial support.

Participating countries: Open to all Latin American and Caribbean countries.

5. Title: Training in accelerograph and seismograph handling.

Brief description: To train young scientists in accelerograph and seismograph handling and data generated.

Principles of action: Transfer of knowledge

Organizations responsible: FUNVISIS (Caracas) with ROSTLAC's financial support.

Participating countries: All Latin American and the Caribbean countries.

Note: Activities (1) to (5) are carried out on a yearly basis.

6. Title: Other activities carried out during 1983 and 1984.

- Support to the Symposium on neotectonics, seismicity and geological risk in Venezuela and the Caribbean, FUNVISIS, Caracas, Venezuela, 23-28 October 1983.
- Support to the First Latin American Conference on phosphoric rocks, Cochabamba, Bolivia, 10-15 October 1983.
- International course on seismic hazards in major engineering works, ESPOL, Guayaquil, Ecuador, 13-20 February 1984.
- Meeting of the working group on geothermics of medium and low enthalpy,OLADE, São Paulo, Brazil, 12-16 March 1984.
- Meeting of the working group on the evaluation of thermic potential, OLADE, Panama, April 1984.

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Section VII - Water sciences

A. Activities at world level

1. Title: Water Resources Programme.

Principles of action: The main courses of action which are complementary are:

- the stimulation and co-ordination of studies concerning the assessment, exploitation, conservation and management of water resources through the International Hydrological Programme;
- the promotion and improvement of methods of teaching the water sciences and water engineering and the development of training in this field;
- the promotion of regional co-operation through support to regional co-operative activities;
- the strengthening of the capacity of Member States to assess their water resources and to manage them on a scientific basis through technical assistance.

The International Hydrological Programme (IHP) is focussed on the scientific and educational aspects of hydrology. The main purpose of the Programme (which is the major component of Unesco's water resources programme) is to develop a scientific and technological basis for the rational management of water resources, both as regards quantity and quality. The specific objectives are:

(i) to improve the assessment of water resources;

(ii) to improve water resources management and planning;

(iii) to improve the evaluation of the influence of human activities on the water cycle;

(iv) to promote education and training in the field of water sciences; and

(v) to increase the capacity of Member States to develop and manage their water resources.

Co-ordinated programme: The content of each phase is determined by the General Conference of Unesco following recommendations of the IHP Intergovernmental Council and adopted by intergovernmental conferences bringing together all Member States. Under the arrangements agreed between Unesco and WMO (World Meteorological Organization) such conferences are convened jointly by the two organizations in order to better harmonize their respective programmes in the field of water resources.

In August 1981, the "International Conference on Hydrology and the Scientific Bases for the Rational Management of Water Resources", was held in Paris - convened and organized jointly by Unesco and WMO, each of which presented detailed reviews of its current activities. Numerous other international governmental and non-governmental organizations with water programmes also presented reports. With this

as background information, the representatives of the Member States of Unesco developed and approved an outline plan of IHP-III. The detailed plan was approved in March 1984 by the Intergovernmental Council of IHP.

The Plan of the IHP is keyed to the targets contained in the United Nations Water Conference (1977) Action Plan and in a more general context it contributes to attaining the goals set forth by the United Nations Conference on Science and Technology for Development (1979).

The ultimate goal of the present phase of the International Hydrological Programme (IHP-III) is to help solve the crucial hydrologic, water management and water related socio-economic development problems as can be foreseen in the second half of the decade 1981-1990 and in the following years.

The Plan: As in previous phases, two main lines of emphasis have been established: a scientific programme devoted to the consolidation and advancement of knowledge, and an education programme wherein the transfer of knowledge, techniques and skills are included.

What is IHP-III?: The programme of IHP-III represents a significant departure from the earlier IHD/IHP efforts. Although the programme will continue to have a strong emphasis on the traditional hydrologic sciences, the increasing importance of rational water management has required that a much broader view of the programme be taken. This concept of IHP-III, then, has led to a much greater consideration for applications of results. It has also required that the scope of the programme give greater effort on areas and audiences which, up to this time, would not have normally been thought of as part of a programme on hydrology.

The integrated approach to water resources management requires that not only technical professionals but also planners, policy-makers, decision-makers and the general public have an appreciation of the possibilities and the limitations of man's activities with respect to our water resources. They must have an understanding of hydrology, in the broadest meaning, if they are to rationally use their influence on the planning process. In order to know what can be done, man must understand how his past activities have affected the water resources. By learning from the past, man might be able to operate water systems in such a way as to avoid or at least to minimize any negative side effects.

The planned activities will not stop with the production of reports. IHP-III emphasizes efforts to take the information to the user. Much greater use is being made of regional seminars, workshops and symposia. But telling about a product is not as effective as showing it. So, wherever possible, the use of pilot/demonstration projects is emphasized. The immediate practicability of results is being stressed, and wherever possible the projects' existence used as a means of training on the job those who can later apply the processes.

In addition to the specialized seminars and workshops that will result from the technical studies, the regular educational component of IHP continues. Greater emphasis, however, is being given to the technician-level training.

And, finally, the development of technical documents will be given an additional component. Because IHP-III is aimed at a much broader audience than before, an emphasis on the production of popularized brochures will be made. These short, well-illustrated, non-technical presentations will be developed whenever applicable.

IHP-III continues to emphasize the scientific and educational aspects of hydrology and other water-related disciplines, but promotes an interdisciplinary approach to water resources planning and management based on contributions from environmental and social sciences, general education programmes, and scientific information systems. And in so doing, IHP-III is broadening its audience and ensuring a greater practical impact to its efforts in helping to solve the world's water resources problems.

The plan is broad-based, having regard to the varying needs of the developed and developing countries and the fact that the execution of IHP activities in Member States is and will be based on their specific social, economic and cultural patterns. With the broad-based approach, the plan has been structured to promote activities that can be carried out at the national level, as well as activities on which regional and international efforts will be concentrated. Special emphasis is given to the specific problems of arid and semi-arid areas and of the humid tropics, in which most of the developing countries are situated.

Considerable attention has been paid to the need for wider dissemination of scientific results and for their application to concrete cases in the field. The plan foresees a greatly expanded effort in the translation of publications so as to include reports addressed to non-technical personnel. It also suggests, for example, that workshops and seminars be held particularly on a regional basis and be illustrated with case studies specific to the respective regions.

Specific activities: The plan of IHP-III identifies eighteen themes (each with specific projects) which have been grouped under the following four sections:

Section I: Hydrological processes and parameters for water projects

Section I covers scientific studies of natural hydrological processes and syntheses of current knowledge. The value of basic research will continue to be appreciated; however, the presentation of results in a manner in which the understanding of the processes and of their combinations can be incorporated into the planning, design, execution and operation of water resource systems will be emphasized in response to the practical needs of the Member States.

Theme 1: Investigations of elements of the hydrological cycle and determination of water balances.

Theme 2: Methods for the investigation of surface and ground-water regimes and for the determination of hydrological parameters for water projects.

Theme 3: Interaction between climatic variability and change and hydrological processes.

Theme 4: Hydrology of particular regions and land areas

Theme 5: Application of special techniques for the study of water resources

Section II: Influence of man on the hydrological cycle

This section covers scientific studies of the influence of man on the hydrological cycle, including water quantity and quality. Activities of man are considered to include direct actions such as land-use changes, consumptive use of water, physical operations on river systems, and additions of contaminants of various kinds, as well as those of a more indirect nature, such as, for example, man-induced climatic changes. These studies will include the effect of changes in the hydrological cycle on social, environmental and ecological aspects relative to water resources. New studies as well as syntheses of existing knowledge will be presented.

Themes 6 through 8 are included in Section II:

Theme 6: Methods for assessing the changes in the hydrological regime due to man's influence.

Theme 7: Environmental impact studies of water projects.

Theme 8: Specific influences of man on the hydrological regime.

Section III: Rational water resources assessment and management

As used in this Programme, assessment goes beyond the production of inventories of available water resources. It draws heavily from previous IHD/IHP activities on the quantity/quality aspects but also introduces evaluation aspects based on socio-economic and environmental considerations. It describes levels of assessment, and the respective analytic techniques available as well as the methods of spatial and time-dependent information presentation. The studies will consolidate existing information and experience on a wide range of alternative approaches to water resources assessment, which will include consideration of institutional opportunities and constraints. Typical aspects to be considered in relation to integrated water management include those of alternative goals and objectives, areal distribution of resources and the concept of inter-basin transfers, conjunctive use of ground and surface waters, integrated operations and reservoir storage and release, competitive uses and international co-operation.

Themes 9 through 12 are included in Section III:

Theme 9: Methodologies for water resources assessment.

Theme 10: Methodologies for integrated planning and management of water resources.

Theme 11: Systems management for reduction of negative side-effects of water resources development.

Theme 12: Development and presentation of information for planners and decision-makers concerning the implications of modern water resources planning and management approaches.

Section IV: Education and training, public information and scientific information systems

The education and training activities of IHP-III cover all aspects of water sciences and are directed at all levels from middle-level technicians through undergraduate to postgraduate. Two main programmes will be followed: (1) hydrology education for the training of specialized personnel (middle-level and postgraduate), and (2) general water resources education with emphasis on the integrated aspects of water resources management (all levels from technicians to graduate engineers and also to planners and decision-makers). While Unesco will continue to sponsor an international network of now about 30 training courses functioning on a regular basis, the organization of ad hoc courses and seminars, primarily at the regional level (in developing countries) and, where possible linked with field projects, will be encouraged.

Although there are many approaches available for the involvement of the public in water resources planning and development it is not an area without controversy. Yet it is quite clear that in many water resources activities, the public must be involved if the programmes are to be successful. Public participation, however, of necessity involves public education in the various aspects related to, for example, the economical use of water and protection against pollution and natural hazards. Alternative concepts and procedures for raising the level of public awareness so that the public can be profitably involved in the proper utilization, protection and conservation of water resources will be studied.

The emphasis on information systems will be on the scientific and technical information, and not on the operational exchange of data. The area is concerned with the methodological principles for the establishment of such information systems at national, regional and global levels. Information on alternative and complementary systems which can be used by institutions interested in developing an information system will be developed.

The need for effective programmes to transfer knowledge and technology requires that an assessment be made of results achieved by previous IHP activities in that area. Lessons drawn from the IHP's own experience and from the experience of water related programmes of other international organizations will permit the development of guidelines for future action under the various projects of IHP-III.

Themes 13 through 18 are included in Section IV:

Theme 13: Promotion of formal education and training in the field of water resources.

Theme 14: Preparation of guidance material to be used for the establishment of training courses in hydrology and water resources management, addressed to various categories of personnel.

Theme 15: Improvement of teaching methods in hydrology and water resources management.

Theme 16: Comparative methodologies for public information and the promotion of public participation in the proper utilization, protection and conservation of water resources.

Theme 17: Scientific information systems: to facilitate the flow and utilization of scientific and technical information in the field of water resources.

Theme 18: Methods for the effective transfer of knowledge and technology, related to water resources, and for the evaluation of their impacts in developing countries.

Background information: the basic documents are the 22 C/5, Major Programme X.3, paragraphs 10301-10368, Final Report of the Sixth Session of the Intergovernmental Council of the IHP, Paris, March 1984, Unesco document SC/MD/76, and the Unesco brochure entitled "IHP International Hydrological Programme and Related Unesco Programmes in Water Resources, 1984-1989".

Organization responsible: Unesco

Organization of IHP:

Unesco Secretariat: Unesco Headquarters provides the Secretariat for the IHP.

The Intergovernmental Council of the IHP: the principal role in the detailed programming of IHP and its periodic evaluation belongs to the Intergovernmental Council of the IHP. The responsibilities of the Council are defined by its Statutes in the following way:

(a) the Council shall be responsible... for guiding and supervising, from the scientific and from the organizational point of view, the implementation of the programme;

(b) studying proposals concerning developments and modifications of the programme and also plans for its implementation;

(c) recommending scientific projects of interest to Member States and assessing priorities among such projects;

(d) co-ordinating international co-operation of Member States in the framework of the programme;

(e) making any necessary proposals for co-ordinating the programme with those conducted by all the international organizations concerned;

(f) assisting in the development of national and regional projects related to the programme;

(g) taking any practical or scientific measures that may be required for the successful implementation of the programmes.

Membership of the Intergovernmental Council of IHP is composed of 30 Member States of Unesco elected by the General Conference at its ordinary sessions, taking due account of the need to ensure equitable geographical distribution. The terms of office of the members of the council begin at the close of the ordinary session of the General Conference at which they are elected, and expire at the close of the second ordinary session of the General Conference following it. The terms of half of the Council expire at each General Conference, it being understood that outgoing members are to be replaced by members belonging to the same regional group. The members are eligible for re-election.

Preparation for Council sessions is under the direction of the Council Bureau composed of the Chairman, four Vice-Chairmen, and the immediate past Bureau Chairman. The composition of the Bureau also is expected to reflect equitable geographical distribution.

IHP National Committees: the General Conference invites all Member States to participate in the IHP according to their interests and possibilities and recommends that they establish permanent National Committees relevant to the programme. These committees have as their main purpose the development of programmes at the national level corresponding to their needs. The participation in the IHP permits them to achieve this in conjunction with the international framework provided by the IHP and to benefit from the bulk of worldwide experience available as a result of the programme's execution. The National Committees are also called upon to play an important role in developing the exchange of information between countries participating in the IHP, and in arranging agreements for bilateral and regional co-operation in hydrology. More than 130 Member States have established National Committees or identified Focal Points for the IHP.

The Statutes of the Intergovernmental Council of the IHP indicate that regional committees for the study of water resources may be established on the initiative of Member States of the same region sharing a common hydrological interest. The General Conference of Unesco has recommended strengthening existing regional committees and creating new committees, expressing the wish that they make appropriate arrangements for the study of specific International Hydrological Programme projects at the regional level. The Intergovernmental Council of IHP cooperates closely with these regional committees and gives them all possible assistance.

Assistance requested: The General Conference has further recommended that Member States which have achieved a high degree of development in hydrology assist the developing countries, in so far as they request, to participate in the International Hydrological Programme and to develop their hydrological activities in the framework of the IHP, by providing them the services of consultants and equipment, by means of bilateral projects, and by providing facilities for the on-the-job training of specialists from developing countries in appropriate institutions. Under the terms of the Council's Statutes, voluntary contributions may be accepted as trust funds in accordance with the financial regulations of Unesco. It is hoped that the very encouraging trend noticed during IHP-II when a number of National Committees assumed responsibility for the execution of certain international projects will be maintained during IHP-III.

Participation of other International Organizations in the Programme: Because the scientific and educational aspects of IHP are of such importance for all activities concerning water resources development and management, the various organizations of the United Nations system with responsibilities in this field are invited to participate. The General Conference of Unesco has specifically directed the Intergovernmental Council of IHP to take proper account, in the planning of its activities, of the contributions which various international organizations such as the United Nations Environmental Programme, the World Meteorological Organization, the Food and Agriculture Organization, the World Health Organization, the International Atomic Energy Agency and other organizations of the United Nations system, can make to the successful implementation of the Programme. The contributions

can take different forms, ranging from representation at the meetings of the Intergovernmental Council and its bodies to the execution of some of the projects included in the IHP. Without question, the participation of the organizations of the United Nations system in the activities of the Intergovernmental Council facilitates the exchange of information and the harmonization of the various programmes in the field of water resources conducted by these organizations. It also enables the members of the Council to have a more complete picture of the activities undertaken by the United Nations system in this sphere. Bilateral intersecretariat arrangements covering the field of water resources, such as those concluded by Unesco with WMO and FAO in 1973 and 1974, facilitate the participation of the respective organizations in the International Hydrological Programme and the necessary co-ordination between the IHP and the specific programmes conducted by those organizations.

Related objectives: From the scientific point of view, the objectives of the International Hydrological Programme are closely related to those of international non-governmental organizations such as the International Association of Hydrological Sciences (IAHS), the International Association of Hydrogeologists (IAH), the Scientific Committee on Water Research (COWAR) of the International Council of Scientific Unions (ICSU), the International Association for Hydraulic Research (IAHR), the International Commission on Irrigation and Drainage (ICID) and the International Water Resources Association (IWRA). It thus seems appropriate that these organizations should participate in the IHP, act as scientific advisers for various projects and even take full responsibility for the implementation of some of them. The participation of the non-governmental organizations in the programme ensures that the Intergovernmental Council of IHP is kept permanently informed about the views and experiences of the international scientific community.

Publications: As part of Unesco's contribution to the objectives of IHP, two publication series are issued: Studies and Reports in Hydrology, and Technical Papers in Hydrology. In addition to these publications, and in order to expedite exchange of information in the areas in which it is most needed, some works are issued in the form of Technical Documents. A list of Unesco publications issued in the field of water sciences is available upon request.

B. Activities at regional level

In the last few years, many research institutions have emerged in Latin America and the Caribbean, as well as specialized education and training courses at all levels. Specific research groups have become stronger, and at the same time, financing structures for some groups have been consolidated. This has enabled national and international scientific communities to form associations, and in some countries sound systems for co-ordinating research activities have been established.

In South American countries there are several training courses in water resources carried out by universities or sponsored by governmental organizations which deal with water. Unesco's collaboration in hydrology courses of the region has been important, including support for several years to a course in Brazil, and now to another one in Argentina. Another training activity sponsored by Unesco is the Roving Postgraduate Course in Hydrology and Water Sciences in the Central American Isthmus (CRICA) which has been held every year since 1980, in different countries of Central America, on a rotation basis.

In 1982, UNESCO/ROSTLAC published the Methodological Guide for the Computation of the Water Balance of South America as a regional manual for the evaluation of the surface and aerological water balance. Several countries have initiated the preparation of water balances of selected basins, using the methodology proposed by Unesco. The methodology is already being disseminated in courses on water resources in some universities. Several other countries have stated that they intend to use the Guide in national water balances.

In July 1977, Unesco launched the Programme of the Hydrogeological Map of South America, with the participation of all the countries of the continent. Several meetings were held for regional co-ordination. National co-ordinators have been appointed, as well as the responsible entity for the preparation of national hydrogeological maps. Several South American countries (Brazil, Ecuador and Venezuela) have already undertaken national hydrogeological mapping as a contribution to this programme. The countries of this region are now co-operating in an endeavour to complete the Hydrogeological Map of South America by 1987.

Recent important conferences held in the region involve:

(1) Regional Meeting on Snow Hydrology (Mendoza, Argentina, 27-29 October 1982);

(2) International Workshop on Karst Hydrology of the Caribbean Region (Havana, Cuba, 5-12 December 1982);

(3) International Colloquium on Hydrology of Flatlands (Olavarría, Argentina, 11-20 April 1983);

(4) Second Meeting of IHP National Committees of South America (Brazilia, Brazil, 26-29 July 1983);

(5) Symposium on the Application of Mathematical Models in Hydrology and Water Resources in Latin America (Tegucigalpa, Honduras, 19-21 September 1983);

(6) Workshop on Snow and Ice (Santiago, Chile, 2-8 December 1984).

An Experts' Meeting on the Major Regional Project (MRP) on the Rational Utilization and Conservation of Water Resources in Rural Areas of Latin America and the Caribbean was held in Mexico City in March 1982. This meeting was sponsored by Unesco and organized by the Mexican National Committee for the IHP, with the co-operation of the Commission for the National Water Plan (CPNH) and the National Arid Zones Commission (CONAZA). Specialists from various countries in the region, as well as representatives of international organizations, attended the meeting.

The objective of the Mexico meeting was to prepare a proposal for the operation of the MRP on a regional level, identifying the pilot research, educational and demonstration projects which should be part of the MRP and the complementary supporting projects, as well as to formulate recommendations with a view to their co-ordination, execution, dissemination and financing. Working groups presented thirty-three proposals for projects on the following subjects: water management, irrigation and drainage, integrated development, education and dissemination, drinking water and sanitation.

The Major Regional Project for Latin America and the Caribbean is aimed at bringing back life to rural areas by combining the principles of both traditional and modern technologies in low-cost structures and systems appropriate to these areas. Building on the first years of experience the horizontal distribution of information is being increased. Through this effort it is expected to encourage and assist in the development of national programmes of education and training for rural populations through the development of technical material, and the establishment of mass media public information campaigns. Among the various media techniques employed will be radio, video, films, posters and training manuals. The project continues to serve participating Member States in its co-ordination function among the numerous national pilot and demonstration projects.

Non-conventional sources sought: Among the projects that have been promoted are the use of non-conventional water resources such as fog and dew in the arid areas as well as non-conventional energy resources such as extreme daily temperature fluctuations, water current and solar radiation to transport, desalinate and pump water. Attention is also being given to erosion control and water resources management by such techniques as terracing, construction of farm ponds, and to the stimulation of water economizing practices such as porous pot irrigation.

Great emphasis is placed on the exchange of experience by the interaction of experts among the co-operating Member States. These include workshops, on-the-job training, pilot studies and regional conferences. Technical and general audience information material is prepared.

Training courses: Information about Unesco's international network of postgraduate courses for specialists and technicians covering the fields of hydrology, water engineering and the management of water resources is available upon request. These courses, which are financed and organized by institutions in the host countries, give priority to specialists from developing countries. Some courses receive additional financial assistance in order to increase the number of participants from these countries.

Training courses for technicians and their instructors, decision-makers, planners and water resources administrators are organized in developing countries through the Regional Offices for Science and Technology.

At the request of Member States, missions by staff members and consultants are provided to help them formulate and develop teaching and training programmes, set up the necessary infrastructure, establish co-operation agreements, and develop regional training networks.

Priority is given to the least developed countries, their projects and the training of their specialists, with female candidates being given special consideration.

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Section VIII - Intergovernmental Oceanographic Commission's (IOC) programme

A. Activities at world/regional level

1. Title: Marine sciences (Intergovernmental Oceanographic Commission)

Main aim: 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 (Article 1.2 of the IOC Statutes).

Specific activities:

1. At the world level

- Ocean Sciences

(i) Global Investigation of Pollution in the Marine Environment (GIPME):

(a) Studies and international meetings on the entry, distribution and transfer of pollutants.

(b) Baseline studies on the levels of the most important pollutants in each ocean region and in each component (water, organisms, sediments, atmosphere) of the UNEP Regional Seas Action Plans.

(c) Studies on dose/response relationship and on methods used to assess marine pollution (preparation of standards, methods of analysis and intercalibration) with a view to regulatory and monitoring activities.

(d) Development and testing of models based on observational data.

(ii) Ocean Dynamics and Climate (ODC):

(a) Tropical Ocean and Global Atmosphere (TOGA) Study.

(b) Development of Ocean Observing Systems (OOS).

(c) World Ocean Circulation Experiment (WOCE).

(iii) Ocean Science in Relation to Living Resources (OSLR):

(a) International Recruitment Programme (IREP), to study the relationship between environmental variables and recruitment to fish stocks.

(b) Sardine-Anchovy Recruitment Project (SARP) in various parts of the world.

(c) Other studies on the scientific basis for improved use and management of living marine resources.

(iv) Ocean Science in Relation to Non-Living Resources (OSNLR, jointly with UN-OETB):

(a) Sea-floor mapping.

(b) High-energy environments.

(c) Deep-ocean floor.

(d) Hydrothermal activity.

(e) Environmental impact and protection

(v) Ocean Mapping (OM):

(a) General Bathymetric Chart of the Oceans (GEBCO), (GEBCO, jointly with IHO).

(b) Regional bathymetric charts and overlay sheets (marine geology, geophysics, oceanography, etc.), including an International Bathymetric Chart for the Atlantic and the Pacific Coasts of Central America.

- Ocean Services

(i) International Oceanographic Data Exchange (IODE):

(a) Preparation of international guides and handbooks, and standardized formats for recording and encoding data.

(b) The establishment of a Marine Environmental Data and Information referral system (MEDI).

(c) Development, in conjunction with FAO and the UN-OETB, of an Aquatic Sciences and Fisheries Information System (ASFIS).

(d) Provision of assistance for the development of national centres for the collection, archiving and exchange of oceanographic data, particularly in the developing countries.

(ii) Integrated Global Ocean Services System (IGOSS, jointly with WMO):

(a) Development:
- of an IGOSS observation system;
- of telecommunications arrangements;
- of meteorological, oceanographic and marine observation techniques;
- of data exchange and archiving.

(b) Assistance to regional ocean monitoring programmes.

(c) Assistance with the training of specialists in developing countries and with the various aspects of work undertaken as part of IGOSS.

- Training, Education and Mutual Assistance (TEMA)

(a) Evaluation of the resources and needs of Member States with regard to facilities, equipment and staff for training.

(b) Establishment, co-ordination and evaluation of training, education and mutual assistance programmes.

2. At regional level

It is mainly as part of the activities of the Intergovernmental Oceanographic Commission (IOC) that regional co-operation in marine sciences is being developed: through its Sub-commission for the Caribbean and Adjacent Regions (IOCARIBE), IOC, among other things, plans, promotes and co-ordinates specific regional programmes of marine research, ocean services and related activities in the region, in conformity with the objectives of the Commission and the priorities of the countries of the

region. It co-operates, for instance, with FAO's Western Central Atlantic Fisheries Commission (WECAFC).

IOC also has Programme Groups for: the Western Pacific (WESTPAC); the Co-operative Investigation in the North and Central Western Indian Ocean (IOCINCWIO); the Central Indian Ocean (IOCINDIO); the Central Eastern Atlantic (IOCEA); and the Southern Oceans (IOCSOC). It also has a Joint Working Group on the Investigation of El Niño, with WMO and CPPS. It also co-operates more generally with CPPS in programmes relating to ocean sciences and ocean services. In carrying out its work at the regional level the IOC co-operates with UNEP in the implementation of relevant parts of its Regional Seas Action Plans.

IOC Member States, particularly the industrialized countries in IOCARIBE, have actively supported certain on-going programmes recommended by the former IOC Association for IOCARIBE, particularly research and monitoring of marine contaminants and the related preparatory training activities and equipment acquisition. The Sub-Commission for IOCARIBE is the first IOC sub-commission: it held its first session in Curaçao, Netherlands Antilles, 20-25 August 1984. The IOC, through its Sub-commission (and formerly through its Association) is undertaking marine pollution studies under the UNEP Action Plan for the Wider Caribbean.

The organization of IOC:

- the Assembly, the Executive Council (both decision-making) and the Secretariat (supported by the UN, FAO, WMO and IMO, as well as Unesco, under the ICSRPO Agreement) located in Unesco;
- subsidiary bodies: Sub-commission, Working Committees, Programme Groups, Working Groups, Groups of Experts, and Task Teams.

Participants: Membership in accordance with Article 4.1 of the IOC Statutes ("Membership of the Commission shall be open to any Member State of any of the Organizations of the United Nations system").

Participation in IOC is at present as follows: 112 Member States (including the following states of Latin America and the Caribbean: Mexico, Guatemala, Nicaragua, El Salvador, Costa Rica, Panama, Cuba, Haiti, Dominican Republic, Jamaica, Trinidad and Tobago, Colombia, Venezuela, Guyana, Suriname, Brazil, Uruguay, Argentina, Chile, Peru, Ecuador; also including the United Kingdom of Great Britain and Northern Ireland, United States of America, France and the Netherlands, each having possessions in the region; the United Nations organizations which are members of the Inter-Secretariat Committee on Scientific Programmes Relating to Oceanography (ICSPRO)(i.e., the United Nations, Unesco, FAO, WMO, IMO) and three advisory bodies (the Scientific Committee on Oceanic Research (SCOR) of the International Council of Scientific Unions (ICSU), the Advisory Committee on Marine Resources Research (ACMRR) of FAO, and the Engineering Committee on Oceanic Resources (ECOR)).

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Section IX - Marine sciences programme

A. Activities at world level

1. Title: Major Interregional Project for Research and Training leading to the Integrated Management of Coastal Systems (COMAR).

Brief description: COMAR is one of the "Major Projects" of Unesco. It concentrates on the coastal marine environment, the socio-economic and scientific importance of which has been increasingly appreciated during recent years in coastal countries, developing and developed alike. The coastal areas are the site of complex natural systems where intense interactions occur between land-sea and atmosphere. The understanding of the functioning of coastal systems, however, is not only relatively sparse and fragmentary, but lagging behind scientific knowledge of the adjacent terrestrial and marine ecosystems.

Principles of action: the need for a sound management of the coastal environment and its resources, requires proper understanding of this environment and of the functioning of its various systems, including their responses to the impact of man's use on them. During the initial stage of COMAR, the main systems, such as mangroves, coastal lagoons, estuaries, coral reefs, etc., were considered separately in view of the great complexity of the coastal environment, the scarcity of means and the need to consider various aspects in depth. The interactions and exchange of energy and material between the various coastal systems are further considered. Besides reviewing and tempting to synthesize the scattered existing knowledge, the project promotes further research activities of these systems, of their interactions and relations with sea and land, especially on a regional basis to secure a firm basis for the needed management guidelines and programmes.

Main aims:

(i) to assist Member States in:

  (a) defining their needs and priorities regarding the coastal environment, research and management;

  (b) acquiring and completing the necessary scientific knowledge on the functioning of the natural coastal systems and on the consequences of impacts from socio-economic origin;

  (c) training teams of specialists as needed, and acquiring the necessary manpower and supporting facilities;

(ii) to develop in the different regions field programmes responding to the different needs for surveys, research and training concerning scientific research and management policies and guidelines, including the need for public information.

Background information: preliminary activities started in the various regions at times during the preceding decade. They were structured in the major interregional project during 1979. At its twenty-first session the General Conference adopted resolution 2/01 which endorses under item (h) the present project.

Organizational machinery: Unesco executes, through its regular programme, the initial project activities, together with the institutions concerned in the participating Member States, and in co-operation with other United Nations organizations having interests in this field. Scientific input is received from the international community through co-operation with various bodies of ICSU (International Council of Scientific Unions). Examples are: (i) SCOR/UNESCO Working Group on Mangrove Ecology, and (ii) SCOR/IABO/UNESCO Working Group on Coastal-Offshore Ecosystems Relationships. After field programmes have been developed for the various regions, they are submitted for extra-budgetary funding.

Participating countries: the majority of coastal Member States including 22 from Latin America and the Caribbean participate in one way or another in the COMAR project activities, like do other Member States in other regions.

B. Activities at regional and national levels

1. Title: Development of national and regional infrastructure in the marine sciences in Latin America and the Caribbean

Brief description: the activities of this programme are various: exchange of scientists, consultant advice on manpower, training and research aiming at the development of new projects; provision of fellowships, study and travel grants; training courses, workshops, assistance in strengthening marine science curricula, provision of books and equipment, etc.

Principles of action: many coastal states are exploiting their marine and coastal resources in various ways (e.g. fishing, mining, tourism) without having sufficient capabilities in the marine scientific and technological fields to ensure the optimum long-term use of these resources, both from a socio-economic as well as environmental point of view.

Main aim: to assist Member States in developing or strengthening the training, education and research in marine science and technology, particularly in regard to coastal systems, in order to increase local capabilities for better understanding and controlling problems that are likely to be caused by the multiple uses of the marine environment.

Specific activities and achievements:

(i) Arrangements for fellowships and grants, advice to Member States by staff members and consultants, exchange of scientists, etc.

(ii) Preparation of the COMAR Regional project for research and training on coastal systems of Latin America and the Caribbean (COSALC). Implementation of three COMAR of the COSALC sub-projects: one on interrelationships and productivity gradients between three tropical-subtropical ecosystems (coral reefs, seagrass beds and mangroves); a second on coastal lagoons presently initiated as a pilot project in Brazil, Venezuela and Mexico; and the third, on beach and nearshore stability (erosion vs. sedimentation), also a pilot effort in the small islands (Lesser Antilles) of the eastern Caribbean;

(iii) Three Unesco-sponsored training courses in coastal geology presented in Argentina, Uruguay and Brazil;

(iv) Unesco travel and DSA to participants in and partial cost support to the organizers of various advanced courses in marine biology, including benthic and pelagic ecology, environmental impact of contaminants on plant and animal communities, etc., at universities in Argentina, Chile and Uruguay.

Participating countries: the majority of coastal Member States in the Latin American and Caribbean regions participate in one way or another in the activities carried out under this programme.

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Section X - Office of Statistics, Division of Statistics on Science and Technology

A. Activities at world level

1. Title: Statistics on science and technology

Principles of action: activities of the Office of Statistics in this field are based essentially on the following principles:

(i) statistics on science and technology constitute useful management tools for the assessment, policy-making, planning, evaluation and control of the development of scientific and technological activities, which in turn contribute to the general socio-economic development;

(ii) internationally comparable science statistics can be used to indicate the relative position of the country in comparison with other countries and consequently aid in national science policy-making. By revealing the imbalance in the distribution of world resources devoted to scientific and technological activities, and by facilitating the identification of areas likely to be of interest for some common actions, comparable science statistics serve to promote international co-operation in this field.

Main aims and functions:

(i) Collection, publication and dissemination of statistical data on scientific and technological activities and improvement of techniques for processing them;

(ii) continued expansion of the scope of the collection on science statistics, which has so far been limited to R&D, to encompass other aspects of scientific and technological activities such as scientific and technological information and documentation (STID) and scientific and technological education and training (STET) at broadly the third level;

(iii) preparation of analytical studies, and statistical support for international and regional conferences;

(iv) amelioration of the international comparability of data by establishing international statistical standards and promoting their implementation, and advancement of statistical methods;

(v) training of personnel and improving the science statistics infrastructure in Member States.

Specific activities:

(i) Systematic collection of data concerning qualified manpower and human and financial resources devoted to R&D, and computerization of these data;

(ii) Expansion of the scope of statistics on science and technology to cover, apart from research and experimental development (R&D) activities, also scientific and technological information and documentation (STID) and scientific and

technological education and training (STET), at broadly the third level, by setting up the conceptual framework and the fundamental international methodologies and standard classifications; pilot surveys on these two activities (i.e. STID and STET activities);

(iii) preparation of analytical studies such as estimates of interregional disparities in the human and financial resources devoted to R&D, integrated approach to S&T indicators, transfer of resources for R&D from developed to developing countries, various indicators based on the most recent information and correlating science and technology data with other economic and social statistics. Imputation of missing data and projections of qualified manpower potential. Preparation of statistical documents for international or regional ministerial conferences on science and technology (UNCSTD, CASTARAB, CASTASIA, CASTALAC);

(iv) establishment of international standard classifications in statistics on science and technology. Publication and distribution of a manual which incorporates these standards, to national bodies in charge of the collection of science statistics. Undertaking of methodological studies and preparation of practical guides and manuals for data collection with a view to improving the scope, accuracy and reliability of basic data. Advice to national statistical services on survey methodology and on the application of basic international concepts. Holding of regional seminars to present the international methodology. Maintaining and developing co-operation with other United Nations agencies as well as intergovernmental organizations such as CMEA, EEC, OAS and OECD; and

(v) assistance to Member States in the form of advisory missions, pilot projects and regional as well as national training seminars, with the intention of building up their statistical capacities and harmonizing their national practices with the international concepts. Exchange of information by means of the annual publication of the "Annotated accessions list of studies and reports in the field of science statistics".

Principal achievements:

- Publication of comprehensive worldwide statistics on R&D in the Unesco Statistical Yearbook, the Unesco Statistical Digest, the United Nations Statistical Yearbook, and in the Current Surveys and Research in Statistics (CSR-S) series of the Unesco Office of Statistics.
- In preparation for the collection of statistics on scientific and technological information and documentation (STID) activities, the basic conceptual framework and preliminary methodology conceived by Unesco have been field-tested in Sudan, Poland Australia and Mexico. The results obtained from these field tests were used as input in the preparation of a preliminary Guide to statistics on STID. Pilot surveys applying the methodology proposed in the Guide have been conducted in Sudan, China, Poland and Bangladesh. Based on the results of these surveys and on the comments of national experts, a revised version of the Guide has been prepared and will be disseminated to all Member States for their comments and/or eventual application. In the long run, the Unesco Office of Statistics will provide direct technical assistance to countries intending to launch STID surveys, through advisory missions and national seminars.

- Concerning statistics on scientific and technological education and training (STET) at broadly the third level, a meeting of experts (category VI) was organized to discuss the scope and methodology of collection of statistical information on this activity. As a follow-up to this meeting, a feasibility study pertaining to selected aspects of STET was undertaken in Poland on the basis of the country's current statistical data collection. Other feasibility studies will be carried out, such as the testing of a model questionnaire for the collection of data on life-long training of scientists and engineers in scientific and technological institutions.
- Publication of analytical studies, reports and selected international statistics on science and technology in the CSR-S series "Current Surveys and Research in Statistics". Contribution in the supply of statistics to UNCSTD and various regional intergovernmental conferences and meetings such as CASTASIA II, CASTARAB II, CASTALAC II, etc.
- As a follow-up to the adoption by the Unesco General Conference at its twentieh session of the Recommendation concerning the International Standardization of Statistics on Science and Technology, a Provisional Manual for Statistics on Scientific and Technological Activities was prepared, published and distributed to national authorities for their comments and implementation. This manual has been revised, published and distributed to Member States. In addition, a revised version of the Guide to the collection of statistics on science and technology has been completed.
- Collaboration with ECE in organizing a meeting of statisticians on the Development of Science and Technology Statistics.
- Efforts in harmonizing existing national practices in the collection of statistics on science and technology are being increased. So far, comparative studies of methodologies adopted by a number of Latin American countries such as Argentina, Brazil, Chile, Colombia, Cuba, Mexico, Peru, Uruguay and Venezuela have been completed. Similar studies will be extended to other regions of the world. The ultimate goal is to be able to advise Member States on how to align their principal methodologies to the international standard based on the result of these comparative studies.
- Holding of five regional training seminars (Category VII) on science statistics in Rabat, Nairobi, Dakar, Montevideo and Kingston for specialists from the Arab, English-speaking African, French-speaking African, Latin American and the Caribbean Member States, respectively. Another seminar on survey methods modelled on international standards will be organized for the English-speaking Asian countries (in 1984). Two ad hoc national workshops on the application of Unesco international standards took place in Beijing (Peking), China in 1981 and 1983. Similar advisory services will be provided on the occasion of staff missions.
- Collaboration with Member States (Egypt and Sudan) in launching pilot surveys on the collection of statistical data on scientific and technological activities, particularly on R&D activities.
- Annual publication of the "Annotated Accessions List of Studies and Reports in the Field of Science Statistics".

Background information: programme launched in the early sixties based on the resolutions adopted by the General Conference of Unesco which authorize the Director-General to collect, analyse and disseminate statistical information relevant to Unesco programmes in education, science and culture, to promote international comparability, to improve statistical methodologies, and to co-operate with Member States in the development of their statistical services and infrastructure;

Unesco's Medium-Term Plan for 1977-1982, objective 10.2; 21 C/5 Approved, objective 10.2;

Unesco's Medium-Term Plan for 1984-1989, Chapter XV.2; 22 C/5 Approved, Part II.B, chapter 2.

Organization responsible: Unesco, Office of Statistics

Organizational machinery: Unesco's General Conference, Executive Board and Secretariat.

Participants: all Member States of Unesco, particularly the national bodies responsible for statistics on science and technology, international, intergovernmental and regional organizations dealing with science statistics such as the OECD, CMEA and OAS.

B. Activities at regional level

A regional training seminar on the implementation of international standards and methods of data collection on scientific and technological activities was conducted in Montevideo, Uruguay from 2-6 May 1983 with 12 participants from ten Member States (Bolivia, Brazil, Chile, Dominican Republic, El Salvador, Honduras, Mexico, Panama, Paraguay and Uruguay). A similar seminar was held in Kingston, Jamaica from 9-12 May 1983 with 8 participants representing the following countries: Antigua and Barbuda, Bahamas, Dominica, Grenada, Guyana, St. Lucia, Suriname and Trinidad and Tobago.

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Section XI - Scientific and technological information

General introduction: the promotion of co-operation in the field of information is one of the major objectives of Unesco. The General Information Programme, an intergovernmental programme which includes UNISIST (a conceptual framework for co-operation in matters dealing with scientific and technological information), is responsible for activities carried out by the Organization and which concern documentation, library and archives services and specialized information systems.

These activities are designed to make information available to a great number of users and to facilitate its application to development.

Thus, one of the major objectives of the General Information Programme in the region is to develop a regional network for the exchange of scientific and technological information in Latin America (INFOLAC) using the experience already acquired during the establishment of the Regional Network for the Exchange of Information and Experience in Science and Technology in Asia and the Pacific (ASTINFO) and the Regional Network for the Exchange of Information and Experience in Science and Technology for Development in the Caribbean region (CARSTIN). INFOLAC will provide a framework for regional co-operation in Scientific and Technological Information and better interlinkages among the relevant information systems in the region, thus improving the access and utilization by the Member States.

It is within this framework that the General Information Programme's action oriented towards Latin American countries should be understood; it is worth adding, before presenting particular objectives and achievements concerning these countries, that general activities undertaken to meet the needs of the scientific community, such as the elaboration of methods, norms and standards relating to the processing of information concern all disciplines -including science and technology- and can also be conducted at the regional as well as the national levels.

A. Activities at world level

1. Title: Integrated library and information service projects.

Brief description: four integrated projects in library and information services, each lasting 3 to 5 years, to be launched during the biennium, one each in Africa, Asia, Arab States, and Latin America and the Caribbean. Designed for developing countries, these projects will help to establish a wide range of library and information services to meet the needs of user groups in particular sectors or disciplines or for a specific purpose and the services provided will demonstrate the use of modern information technologies in conjunction with traditional library practices.

Principles of action: Unesco's action will consist of technical assistance missions for the design and development of projects and for the preparation of proposals and relevant documentation with a view to obtaining extra-budgetary funding; it will also include advice on the choice of technologies and standards, support for personnel training activities and the provision of equipment such as microcomputers, and reprographic equipment.

Main aims: to help establish national and/or regional data bases for processing the specialized information produced in the countries concerned, to strengthen the capacity of Member States, especially developing countries, to use existing data bases, establishing linkages with host centres, and the local processing of these data bases.

Special activities:

(i) guidelines on the concept, planning and establishment of integrated library and information services projects have been prepared;

(ii) an integrated library and information services project has been initiated at the University of West Indies, St. Augustine, Trinidad and Tobago. This was preceded by a staff mission to assess potential institutions in the Caribbean to locate a pilot project, in March 1984.

Integrated projects have also been initiated in 1984 in Asia and Africa.

The University of West Indies has been provided assistance to procure a large multi-user microcomputer and training for one of its computer specialists in the use of a specialized microcomputer software package in Austria. Further assistance is expected to be provided during 1985 and 1986.

Background information: 22 C/5, paragraphs 07118-07119

2. Title: Index of Information Utilization Potential

Brief description: a study was undertaken in 1980-1983 on the feasibility of establishing a flexible and reliable system for the monitoring and appraisal of a nation's ability and capability to utilize the available information - Index of Information Utilization Potential (IUP). Subsequently, a pilot project was carried out to calculate IUP indicators for a number of countries, consisting of all the countries of Latin America and the Caribbean and, for comparative purposes, a few industrialized countries. This study provides a first outline of the scope and organization of a set of selected information indicator and identifies the main sources of new data and suitable calculation methods.

Purpose of action: this work was carried out on the basis of statistical data for 230 variables available in various international governmental and non-governmental organizations.

Main aims: to calculate IUP measures for a number of countries, assess their internal and logical consistency and provide orientation for the development and maintenance of information indicators.

Specific activities and achievements: the findings of the study were widely disseminated among information experts.

Background information: study resulted from reports on the lack of a commonly accepted theoretical framework for the evaluation of information activities in a given country.

Participating countries: all countries and territories of LAC (42), 6 countries of the Western European and North American region and (2) from eastern Europe.

Reference: PGI-83/WS/29

3. Title: Development of National Information Co-ordinating Bodies (Focal Points and National Information Committees)

Brief description: the Intergovernmental Council for the General Information Programme and its Bureau reflected on several occasions on the need to improve the functions and performance of the National Focal Points (FP) and National Information Committees (NC).

To date, eleven (Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Jamaica, Mexico, Peru, Uruguay, Venezuela) of the LAC countries, have established such bodies, all of which are not equally active.

Specific activities and achievements: several research projects and guidelines involve or refer to activities in various LAC countries.

B. Activities at regional level

1. Title: Regional programme for co-operation in the exchange of information on information activities (INFOLAC)

Brief description: institutional and operational mechanisms leading to formal, stable and efficient inter-institutional co-operation through the launching of joint projects and provision of information on information activities in the region.

Principles of action: the identification of concrete, feasible interagency projects that can be implemented independently of the progress made in the formulation of the INFOLAC project. The provision of information about information activities taking place in the region to the national, regional and international information community so as to speed up the establishment of a solid regional co-operation programme.

Main aims: the gradual formulation of an "umbrella" regional project, with built-in intergovernmental and inter-agency co-ordination mechanisms: the "INFOLAC" project aimed at strengthening national capacities for information handling and at facilitating information flow in LAC.

Specific activities and achievements: PGI/UNESCO jointly with CEPAL/CLADES undertook a consultation on the 24 projects agreed upon by the Ad-Hoc Group of Experts in order to identify a much reduced core of priority projects. The consultation gave as its main result the identification of two priority projects: Project 1 - Action programme for strengthening the national information co-ordinating entities. Project 2 - Information interchange mechanism on information activities in Latin America and the Caribbean.

(a) In view of this result, Unesco and CEPAL have decided to move jointly a step forward in Project 1 and get into the detailed formulation of a corresponding inter-institutional project of regional scope to be presented in due time to funding agencies. Unesco and CEPAL have invited other regional and international agencies to join them in this effort so that the spirit of inter-agency co-operation stimulated at the Caracas meeting is kept and increased.

(b) Preliminary activities include the preparation of guidelines for (a) the strategy of conducting country visits, (b) the kind of information to be gathered by the UNESCO/CEPAL team during the visits to those countries which expressed high interest in the project and (c) preparations required at the national level prior to the visit of the team. The same ten countries were visited in 1983.

As regards the provision of information on information activities in the region as a basic support to effective planning and co-ordination,a workplan was adopted for the establishment of a regional referral network on information activities in Latin America and the Caribbean.

According to this workplan, PGI at the Regional Unesco Co-ordination Office in Caracas has prepared the draft text of the processing manuals, including input sheets, for the nine types or categories of information which were identified as of priority by the Follow-up Working Group. These categories cover information on: (i) documents, reports and other non-conventional bibliographic materials; (ii) projects; (iii) consultant missions; (iv) specialists; (v) events; (vi) training activities; (vii) data bases; (viii) focal points of national, regional and international organizations engaged in information activities; (ix) institutions offering technical co-operation services.

The draft manuals are based on the UNISIST Reference Manual for Machine-Readable Bibliographic Descriptions and the UNISIST Reference Manual for Machine-Readable Descriptions of Research Projects, respectively.

As foreseen in the workplan, PGI/Caracas is implementing a pilot phase involving some 15 institutions in the region. This phase is conceived as a simulation of a fully operational system whereby inputs and prototype outputs are provided throughout the duration of the phase (1984/1985) in order to reach at meaningful conclusions and yield representative results. The objectives of the pilot phase are: (i) to test the relevance and suitability of the nine draft processing manuals and corresponding input sheets; (ii) to determine the difficulties in obtaining information for input into a regional data base; (iii) to assess the usefulness of the prototype outputs (services and products) and the potential demand for them; (iv) to obtain feedback on the overall organizational design required to facilitate input and flow of output at national and regional levels; and (v) to arrive at cost estimates concerning input operations, generation of outputs and equipment required for the eventual computerized phase.

PGI/Caracas is installing micro-computer equipment for the setting up of a regional data base on information activities in Latin America and the Caribbean, using the IV + V System software package for this purpose.

One of the major contributions of PGI to the strengthening of co-operation and networking capabilities in the field of information in Latin America and the Caribbean concerns the introduction of the portable software package IV + V to the region.

Background information: at the first meeting of the Ad-Hoc Group of Experts in Latin America and the Caribbean on possible co-operation in information activities, convened by Unesco in Caracas 1982, the participants had agreed on concrete modalities for inter-institutional co-operation in the execution of current or projected activities within the framework of the information programme of their respective institutions, identifying joint actions in three main areas: education and training, information infrastructure and services, and information policy and planning. In order to ensure follow-up and continuity in these initiative, the 1982 meeting had recommended the creation of a regional programme of co-operation in order to stimulate, within a flexible operational framework, the pooling of financial resources and the establishment of joint regional projects. The meeting also agreed that such a programme should provide on a long-term basis a formal framework for the development of regional co-operation aimed at strengthening national capacities for information handling and at facilitating information flow in Latin America and the Caribbean.

The Follow-up Group met in Caracas during 1983 to review the work done so far and to further develop the strategy for fostering regional co-operation. The group agreed upon the strategy described above.

Participating countries: all the countries of the region

Reference: PGI-82/IPLA/WG/3 and PGI-83/IPLA/WG/5 and numerous other unpublished descriptive documents.

2. Title: Pilot project for the co-ordinated development of national information systems in the Caribbean.

Brief description: during the last four years, Unesco, under its General Information Programme, has been implementing this project based on an action plan which was adopted at a consultation meeting held in Kingston (Jamaica) in May 1980.

Principles of action: consultants and staff missions, studies, provision of equipment and financial assistance for various activities of information infrastructure development and studies on topics of importance in this area contributed to the improvement of information services in the region.

Main aims: three meetings requested Unesco to carry out the preliminary work leading to a major sub-regional project in science and technology for development including a component aimed at improving scientific and technical information services (The Second Meeting of Caribbean Ministers responsible for Unesco Affairs, St. Lucia,19-20 July 1982: the First Meeting of Caribbean Ministers responsible for Science and Technology, Jamaica, 5-7 April 1983, and the Second Meeting of the Science and Technology Ministerial Sub-Committee, Antigua and Barbuda, 4 May 1984).

Organization machinery: in considering the main deficiencies of the S & T information sector in the Caribbean, Ministers directed specific recommendations to Caribbean States, among which were the following:

(i) development of effective systems for providing direct access to information contained in external data bases and for ensuring access to technological options;

(ii) establishment of mechanisms to ensure that information gathered is available to research and development activities;

(iii) development of the specialized human resources needed to manage the technological information systems, consideration being given to flexible training mechanisms;

(iv) establishment of coherent mechanisms to ensure that all studies and reports are stored in a central agency in a manner that allows easy retrieval, and ensuring that such documents are accessible to those persons and agencies who require them (with due regard to consideration of confidentiality);

(v) support for a network of technological institutions to share information and develop expertise.

Within this context, Unesco, through its General Information Programme, has taken initial steps towards the establishment of a Caribbean Network for the Exchange of Information and Experience in Science and Technology (CARSTIN) and funds were obtained from UNDP for 1984-1986 totalling $ 115.000. Unesco is planning to continue its effort for the development of CARSTIN by committing appropriate resources in its regular programme.

3. Title: Inventory of Information Services on Research in Progress in Latin America and the Caribbean

Brief description: this regional inventory has been initiated in 1984 as a means of providing comprehensive data on information systems covering on-going research in Latin America and the Caribbean which will be published under Unesco's auspices in 1985.

Principles of action: a questionnaire has been prepared and widely disseminated to Member States and regional organizations.

Main aims: the resulting inventory, which will include a comparative analysis of the identified information services, is intended to improve access to information on research and development efforts in the Region as well as to promote co-operation and compatibility among information systems working in this important area.

Background information: this project is one of the activities agreed upon by the Ad-Hoc Group of Experts for the General Information Programme in Latin America and the Caribbean (19-23 April 1982) for implementation within the INFOLAC programme (see part II, item 1).

Organization(s) responsible: the work is being carried out for Unesco by the National Commission of Scientific and Technological Research (Comisión Nacional de Investigación Científica y Tecnológica) of Chile.

Participating countries: all the countries of the region.

4. Title: Data base pilot project at the Latin American Health Sciences Information Centre (BIREME) and the Centro Panamericano de Ingeniería y Ciencias del Ambiente (CEPIS)

Main aims: to test and gradually install during the biennium a documentary microcomputer software package and create regional and national data bases.

Specific activities: provision of microcomputer equipment; appropriate software packages and consultancies if required.

5. Title: Pilot project concerning data base creation at the Instituto Inter-Americano de Cooperación para la Agricultura (IICA-CIDIA).

Main aims: to test and install gradually during the present biennium a microcomputer-based software package and establish data bases in participating countries.

Specific activities: provide software and consultancies if required.

6. Title: Latin American Regional post-graduate programme in information sciences

Brief description: several inter-governmental conferences, held in Latin America, have emphasized the need to strengthen and expand information services and systems at the national level so as to enable them to meet the information needs of the different user communities, both those in the public and private sectors and the general population.

Principles of action: at recent meetings, experts in the field of information in Latin America and the Caribbean have stressed the fact that co-operation in the field of information within the region fosters the development of national information policies and of the respective infrastructures if this co-operation is based on factors common to the countries within this region, such as language, geographical location, communication facilities, economic and social interaction, existing bilateral and multilateral agreements. However, there was consensus at these meetings as regards the fact that human resources continue to be the key problem for the development of information systems and services in the region, especially in the area of management.

Main aims: at the regional meetings on the training of information specialists, organized in recent years by regional and international organizations, it has become clear that joint efforts must be made to harmonize and develop curricula to train faculty members at all levels and to prepare teaching materials in Spanish. This situation led the government of Venezuela to take the initiative of drawing up a project aimed at developing information personnel. The project was approved by UNDP in July 1982 and Unesco entrusted as Implementing Agency. The governments of Costa Rica, Ecuador and Nicaragua supported the project.

Specific activities: as part of the activites foreseen in the workplan of the preparatory assistance phase of the Regional Postgraduate Study Programme in Information Science (RLA/830/020), the Workshop on Curriculum Development was held in Caracas, from 18 to 29 June 1984.

The workshop was attended by 17 specialists from 11 countries in the region, excepting the host country, 16 specialists from Venezuela and 2 observers from the University of Ibadan, Nigeria.

The design of the overall curriculum content for the Regional Postgraduate programme in information science is being submitted (November 1984) to the University Simon Bolivar for final approval and integration in the University programme for 1985.

7. Title: Latin American Symposium of Specialists in Training and Manpower Development Planning in the Field of Information

Held in San José, Costa Rica from 2 to 6 February 1981; organized by the Confederación Universitaria Centroamericana (CSUCA) under Unesco contract (RP).

Main aims: to identifiy and analyze major problem areas which affect information manpower development in the region; to set priorities for information manpower development; to consider possible areas for action.

Participants: 12 specialists from Latin American countries

8. Title: Latin American Seminar on Computerized Information Retrieval

Held in Mexico City from 9-20 March 1981: organized by CONACYT, the Instituto de Investigaciones Bibliográficas and the Colegio de México, under Unesco contract (RP).

Main aims: to train information specialists from the region in the use of computerized information retrieval.

Participants: 25 information specialists from Latin America.

9. Title: Training course in restoration and reprography for archivists of the Caribbean region

Held in Willemstad, Curaçao, Netherlands Antilles, organized by the Caribbean Archives Association (CARBICA). Unesco funds used for provision of the course director.

Participants: 20 archivists from the Caribbean.

10.Title: Training course on data management in geoscience

Organized from 7-12 October 1981, in Ouro Preto, Brazil, in collaboration with CODATA and Unesco (PGI and SC/SER).

Participants: 25 geoscientists and information specialists from Latin America.

11.Title: Regional Seminar on Thesaurus Construction

Held from 9 to 23 July 1982 in Buenos Aires and organized by the Centro Argentino de Información Científica y Tecnológica (CAICYT) under Unesco contract (RP).

Main aims: to present a teaching package on thesaurus construction and offer training in its use to 30 teachers from schools of librarianship and information science of Latin America.

12.Title: Regional workshop on training para-professional staff for service in school and public libraries.

Held in San José, Costa Rica, 2-28 August 1982 and organized by CERLAL under Unesco Contract (RP).

Main aims: to develop a model methodology and curriculum.

Participants: 20 specialists responsible for para-professional training.

13. Title: Consultant mission to Jamaica

Main aims: to advise on plans for the inclusion of regional facilities for teaching archives administration and records management at the Mona Campus of the University of the West Indies.

Organized in the framework of the Regional project for co-ordinated development of national information systems in the Caribbean (Kingston, 25 May - 22 June 1983).

14. Title: Latin American training course on the use of micro-computers in the development of social sciences

Held in San José, Costa Rica, from 11 to 22 June 1984. Organized by the Latin American Faculty of Social Science (FLASCO) in collaboration with MIDIST (France) and Unesco (RP).

Main aims: to familiarize the specialists in social science information with modern documentation and information techniques.

15. Title: Regional seminar on curriculum development

Held in Caracas, Venezuela, from 18 to 29 June 1984, as part of the activities foreseen in the workplan of the Preparatory Assistance phase of the Regional Postgraduate Study Programme in Information Science (RLA/83/020). It was organized jointly by the Instituto Autónomo Biblioteca Nacional and Unesco (RP) with the participation of the University Simón Bolívar as host institution.

Main aims: to provide an opportunity for the exchange of ideas among those concerned with postgraduate studies in information science in Latin America and between them and selected specialists from abroad.

16. Title: Training course in documentation for officials of National Commission of Latin America and the Caribbean.

Held in San José, Costa Rica, from 1 to 5 October 1984.

C. Activities at national level under Regular Programme

1. Country: Argentina

Title: Pilot Project on Numerical Data Services

Brief description: this project is designed to provide a model for the handling and dissemination of statistical data for a wide range of user groups making use of appropriate computerized methods. It is being carried out in Argentina and is centered in the agricultural sector.

Principles of action: Unesco's assistance is being provided in the form of consultancy, training and financial support.

Main aims:

- to set up a pilot information unit for analysis and dissemination of agricultural statistics at national level;
- to train and sensitize policy makers, information specialists and other potential users on the availability and application of such data for development;
- to help lay the basis for a national information system on agricultural statistics which can serve as a useful model and training resource for other Member States in the region;
- to prepare a Unesco evaluation report of the project which can be widely disseminated and used in Member States.

Specific activities and achievements: a two-week consultant mission was provided in late 1982 to help plan the project and two Argentine specialists were given study grants in late 1983 to examine state-of-the-art systems in Europe and North America and to develop a detailed project plan. A contract has been proposed to assist the Argentine authorities in implementing the project itself which should be completed by mid-1986.

Background information: this project has been initiated within the approved programme and budget of Unesco for 1981-1983 (§ 5071, 21C/5).

Organizations responsible: the Faculty of Agronomy of the University of Buenos Aires in collaboration with the State Secretariat of Agriculture and Husbandry (Secretaría de Estado de Agricultura y Ganadería). At the international level Unesco is working on this activity in close consultation with FAO and the Inter-American Institute for Co-operation on Agriculture.

Participating countries: Argentina

Title: Agreement with the Government of Argentina

This agreement was signed to assist the University of Córdoba to expand its reprographic and restoration laboratory and to provide technical training to archivists, librarians and documentalists.

2. Country: Belize

Consultant missions to lecture at Summer School in Basic Library Science organized by the Belize Library Association (July 1982, 1983 and 1984).

3. Country: Brazil

Title: Pilot data base at the Instituto Brasileiro de Informação em Ciência e Tecnologia (IBICT)

Main aims: to test and gradually install during the present biennum microcomputer-based software package and create a toxicology data base.

Specific activities: provide microcomputer equipment, software and consultancies if required.

4. Country: British Virgin Islands

Consultant mission in June 1984 to advise on the development of archival infrastructure.

5. Country: Chile

Consultant mission to study the feasibility of establishing a postgraduate course in information science at the Pontificia Universidad Católica (June/July 1983).

6. Country: Colombia

Consultant mission to advise on the design of a flexible programme to be used in Colombian library schools for the training of public library personnel (October 1982).

7. Country: Guyana

Guyana - Development of a National Scientific and Technological Information System

A two-week consultant mission was provided in 1983 at the request of the Government of Guyana to advise the National Science Research Council on the development of a national scientific and technological information system, including training needs, and to recommend elements for a future international assistance project in this field.

8. Country: Haiti

Consultant mission to advise on the establishment of a two-year training programme for archival assistance at the Institut National d'Administration, de Gestion et des Hautes Etudes (INAGHE)(July-August, 1983).

9. Country: Mexico

Consultant mission to examine the present needs for and the possibilities of establishing a national or regional programme for the training of information specialists at the Centro de Información Científica y Humanística of the Universidad Nacional Autónoma de México.

10. Country: Peru

Title: Pilot project for the modernization of its traditional national archives

Brief description: this project, started in 1980 in Peru under the Records & Archives Management Programme (RAMP) of PGI, can also be considered as having a regional character.

Main aims: the establishment of a Government Records Management Programme emphasizing the creation of a Records Centre and introducing the methodology of archival appraisal and disposal of non-current records.

This project was conducted for a period of four years and was evaluated in Lima in 1983 during a regional seminar organized by the Latin American branch of the International Council on Archives and the Association of Latin American Archivists. Members of the profession from Argentina, Brazil, Colombia, Costa Rica, Chile, Ecuador, El Salvador, Mexico, Panama and Venezuela concluded that the pilot project has achieved a significant degree of success and was a valuable example of RAMP techniques for application to the National Archives of the region.

11. Country: St. Lucia

Consultant mission in 1982 to advise on the establishment of National Archives.

12. Country: Uruguay

Development of National Information System on Research and Development Project in Progress and a Bibliographic Information System within the University of the Republic.

Two three-week consultant missions to advise on the development of these inter-related information systems were provided at the request of the Uruguayan Government in late 1983.

13. Country: Venezuela

Consultant mission to work with the Instituto Autónomo Biblioteca Nacional y Servicios de Bibliotecas and advise on curriculum planning and design for the planned Regional Postgraduate Study Programme in Information Science (RLA/83/020)(June 1982).

D. Activities at national level under the Participation Programme

Since 1981, Unesco, under its General Information Programme has implemented 60 requests in the region under the Programme of Participation in the Activities of Member States, amounting $ 585.000 mainly in co-ordinated activities in support of the Major Programme VII - Information systems and access to knowledge.

In this sense 26 Member States (11 from the Caribbean, 8 from Central America and 7 from Latin America) received 21 consultant missions, as well as fellowships, financial assistance and equipment, in order to:

1. establish and reinforce the national/regional information network;
2. utilize modern technologies of information transfer;
3. provide adequate manpower in the information techniques;
4. advise on the development of modern records management programme.

There could be singled out, for instance:

(a) the consultant missions to Antigua & Barbuda, Grenada, St. Vincent & the Grenadines, St. Kitts-St. Christopher and Nevis, Montserrat, Trinidad and Tobago, to advise on the specific planning of their national information systems;

(b) the provision of micro-computer equipments for the national information services of Barbados, Guyana and Chile;

(c) the provision of fellowships to Panama and Venezuela to train specialists in the information techniques;

(d) the provision of financial contributions to Colombia, Costa Rica, Nicaragua, Peru, for the improvement of their specialized library collections;

(e) the provision of financial contributions to Barbados, Costa Rica and Honduras for the microfilming of documents related to these countries detained in foreign repositories.

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Section XII - Science, technical and vocational education

A. Activities at world level

1. Title: International exchange of ideas and information in science and technology education (mathematics, integrated science, biology, chemistry, physics, nutrition, health and home economics) as well as environmental, technical and vocational education.

Brief description: organization of conferences, meetings and workshops; preparation and dissemination of bibliographical materials and reference documents; technical and financial support for the publication of international newsletters and case studies.

Principles of action: conferences, workshops, case studies, advisory and consultative services including financial assistance; establishment of an international network for the exchange of ideas and information on science and technology education, as well as in technical and vocational education.

Main aims: better adaptation of science and technology, education TVE, and environmental education to the needs of Member States and support to training opportunities for key personnel.

Specific activities and achievements: Meetings:

- international conference on science and technology education for national development (23 November - 2 December 1981);
- meeting of experts to review and assess Unesco's activities in the exchange of ideas and information in science and technology education;
- symposium to review ways and means of incorporating an environmental education dimension in school curricula and teacher training programmes;
- International Expert Meeting on policy, planning and administration of TVE, Paris, 7-11 June 1982;
- meeting of experts on Unesco's future programmes in environmental education;
- International Expert Meeting on Progress and Trends in Environmental Education since the Zbilig Conference, Paris, September 1982;
- International Symposium on Environmental Education, Bulgaria, October 1983;
- financial assistance to some of the ICSU international commissions on science education for organizing meetings as well as publication and distribution of newsletters in different science disciplines.

Publications and studies:

- Studies in Mathematics Education, vol. 2 (1981), vol. 3 (1982) and vol. 4 (1984)
- New Trends in Primary School Science Education (1982)
- Sourcebook on Teaching School Chemistry (1981)
- New Trends in Physics Teaching, vol. IV (1982)

- New Trends in School Science Equipment (1982)
- New Trends in Nutrition Education
- Technical documents and resource materials on nutrition and health education
- Transition from technical schools to work, 1983
- Terminology guide on TVE (E.F.R.S.A.) 1984
- Directory of Selected Research and Teacher Training Institutions in the field of Technical and Vocational Education, 1982
- Policy, planning and management in TVE (a comparative study), 1984
- Directory of Environmental Education Institutions
- Directory of Environmental Education Periodicals
- "Connect" - Environmental Education Newsletter
- Survey on Environmental Education

Training:

International training courses and seminars.

Background information: 22 C/5 Approved, Subprogrammes V.2.1, V.2.2, V.3.3 and X.9.2.

Participating countries: different countries including some from Latin America and the Caribbean.

2. Title: Co-operation with Member States for the implementation of the Revised Recommendation concerning Technical and Vocational Education

Brief description: this Recommendation deals with objectives, policy, planning and administration of technical and vocational education as part of general education as well as in the preparation for an occupational field, etc.

Principles of action: case studies and comparative studies; meetings; reporting on and procedures for implementation; advisory services.

Main aim: to assist Member States in implementing the Revised Recommendations

Specific activities:

- meeting of experts on the implementation of the Revised Recommendation;
- preparation of guidelines for studies on policy (including access of women), planning, administration and cost efficiency of technical and vocational education;
- preparation of a study on reporting procedures related to the implementation of the Revised Recommendation.

Background information: 22 C/5 Approved, subprogramme V.3.3. and Revised Recommendation concerning Technical and Vocational Education (adopted by the General Conference of Unesco, 1974).

3. Title: Improvement of content, methods and materials for science, environmental, technical and vocational education.

Brief description: development of teaching and learning materials, as well as methods, for the teaching of integrated science, biology, chemistry, physics, mathematics, nutrition, health and home economics, environmental, technical and vocational education (including also out-of-school education).

Principles of action: support and technical assistance to national and international organizations for the development of educational materials and methods; research studies applied to science and technology education; making available to Member States technical knowledge, information and materials.

Main aims: to improve the learning of science and technical subjects (in school and out-of-school); making available to Member States knowledge, information and materials on science and technology education, environmental education and technical and vocational education.

Specific activities:

- contracts with educational organizations in Member States (including for the development of science teaching equipment);
- establishment of a bank of illustrations for technical and vocational education;
- preparation of a guide for the organization of production units;
- case studies on the inclusion of productive work in technical and vocational education;
- experimentation of a technical drawing course for general education developed by Unesco;
- studies and resource materials for teachers on nutrition and health education;
- studies on non-formal environmental education;
- teacher's manual in environmental education;
- sourcebook on formal environmental education;
- sourcebook on non-formal environmental education;
- publication of interdisciplinary prototype modules in environmental education;
- publication of teacher training modules in environmental education.

Background information: 22 C/5 Approved, Subprogrammes V.2.1, V.2.2, V.3.3,and X.9.2.

B. Activities at regional level

1. Title: Regional co-operation on science and technology education (including mathematics, nutrition, health and home economics) as well as environmental, technical and vocational education.

Brief description: the Regional Office for Education in Latin America and the Caribbean (OREALC) focussed and intensified its activities in the improvement of the quality of science education, environmental and technical and vocational education, linking of science and technology, TVE with every day problems and the world of work, science popularization, development of low cost didactic materials, promoting and implementing the revised recommendation on TVE, etc.

Principles of action: training seminars and workshops, support to pilot projects on curriculum development, advisory services, exchange visits.

Main aims:

- improvement of science and technology education, of environmental education and of technical and vocational education at the regional level;
- regional exchange of ideas and experience in the above fields;
- development and dissemination of new teaching/learning materials in the above fields.

Specific activities:

- Workshops and seminars for specialists and teachers in science education dealing with preparation of modules and low-cost equipment.
- Publication of a series of modules in science education emphasizing the interrelationship between Mathematics, Physics, Biology, Chemistry and Integrated Sciences.
- Unesco Handbook for Biology Teachers in Latin America, 1982.
- Regional and subregional training seminars and workshops for administration and supervisors in Technical and Vocational Education.
- Organisation of several sub-regional study tours for officials responsible for information and documentation services in technical and vocational education.
- Organisation of a regional meeting on education and the world of work.
- Organisation of a sub-regional meeting on educational and occupational guidance.
- Sub-regional Training Workshop for Teacher Training in Environmental Education in the Caribbean, Jamaica 1983.
- Nutrition, Health and Environment: An Environmental Education Approach in Latin America.
- Multimedia Strategies for Communication Environmental Messages in Latin America.

Participating countries: different countries in the region.

Background information: 22 C/5 Approved, subprogrammes V.2.1, V.2.2, V.3.3 and X.9.2.

C. Activities at national level

1. Title: Improvement of content, methods and materials for acience and technology education (mathematics, integrated science, biology, chemistry physics, nutrition, home economics and health) as well as environmental, technical and vocational education.

Principles of action: support for the organization of workshops, meetings and training courses at national level; development of teaching/learning materials.

Main aims: improvement of the teaching of science and technology in the context of local socio-cultural patterns, as well as the popularization of science and technology for the general public.

Specific activities:

- Advisory services, financial and technical support for national activities in science teaching: environment and technology and vocational education.
- Preparation and publication of several case studies on the application of the Revised Recommendation in technical and vocational education in Member States.
- Preparation and publication of several case studies on innovations in technical and vocational education in countries of the region.
- Experimentation of graphic communication course for general education (developed by Unesco) in several countries.
- Contribution from countries of the region to the international illustration bank.
- Pilot project in science education in several Member States.
- Pilot project in environmental education in rural areas.
- Experimental project in technical and vocational education in rural areas.

Background information: 22 C/5 Approved, subprogrammes V.2.1, V.2.2, V.3.3 and X.9.2.

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