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CO-ORDINATION OF THE WORK OF THE UNITED NATIONS SYSTEM IN THE NATURAL RESOURCES FIELD AND PROGRESS IN THE IMPLEMENTATION BY THE UNITED NATIONS SYSTEM OF THE GUIDELINES FOR ACTION IN THE DEVELOPMENT OF NATURAL RESOURCES

Work programmes, spheres of competence, division of responsibilities and co-ordination measures

Report of the Secretary-General

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* Chapters II and III have been issued as addenda 1 and 3 respectively under the symbol E/C.7/38.

INTRODUCTION

The present report has been prepared in pursuance of Economic and Social Council resolution 1673 C (LII), paragraphs 1 and 2. In paragraph 1 of the resolution the Secretary-General is invited "to prepare a concise report covering the outlines of the work programme and the sphere of competence of the organizations and agencies of the United Nations system in the field of mineral, water and energy resources development, together with the views of those organizations and agencies on the most rational division of responsibilities between them in these fields". Paragraph 2 "further invites the Secretary-General, in consultation with the Administrative Committee on Co-ordination, to draw up proposals as to the most advisable measures to co-ordinate the formulation and implementation of the programmes of the organs, organizations and agencies of the United Nations system in the field of water, mineral and energy resources development, which would define the competence and sphere of activities of those organizations".

Chapter I of the present report describes in summary form the relevant activities of the United Nations including its regional economic commissions, the United Nations Conference on Trade and Development (UNCTAD) and the United Nations Industrial Development Organization (UNIDO), as well as those of the International Labour Organisation (ILO), the Food and Agriculture Organization of the United Nations (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO), the International Bank for Reconstruction and Development (IBRD), the World Meteorological Organization (WMO) and the International Atomic Energy Agency (IAEA), and is based on contributions received from those organizations. 1/ Chapters II and III deal, respectively, with areas of interagency agreement and problems of interagency co-operation in the field of mineral, water and energy resources development, and with proposed measures to co-ordinate the programmes of the United Nations system in such areas. Both chapters were prepared in close consultation with the organizations concerned.

The present report constitutes a response not only to Economic and Social Council resolution 1673 C (LII), but also to Council resolution 1643 (LI) in which the Council called upon the Administrative Committee on Co-ordination (ACC) to submit "separate reports /on various topics/ containing a concise and factual picture of the way in which the system as a whole operates, pointing out in particular any shortfalls or duplication and also the practical difficulties arising from implementation of policies and programmes of work related to the topics in question". In the same resolution, the Council called upon the Committee to bring out in its reports the problems solved and, in addition, to highlight those that were unresolved. At its fifty-third session, in resolution 1728 (LIII), the Council decided that the system-wide study on programmes and spheres of competence in the field of natural resources, being prepared for submission to the Committee on Natural Resources, should serve as the in-depth sectoral study called for in Council resolution 1643 (LI).

1/ The activities of the United Nations Development Programme in the field of natural resources development were described at some length in a paper presented by the Administrator of UNDP to the Committee on Natural Resources at its second session (E/C.7/22 and Corr.2), which should be read in conjunction with the present report.

Chapter II of the present report, in particular, has been prepared with these two differing purposes in mind, and taking into account the requirements of both resolutions. The chapter describes the areas of agreement that have been worked out by the various organizations, in particular within the Sub-Committee on Water Resources of the ACC, and delineates problems that still await solution, together with the views of the various organizations and agencies on each of those problems.

In the consideration of this document, it should be recalled that each United Nations organization has its own approach to activities in the field of natural resources, or activities related thereto, and that the scope of the work undertaken in these areas varies considerably from organization to organization, according to their constitutional mandates and the directives received from their legislative organs and governing bodies. For these reasons, and because they were based on different programme documents, the contributions of the various organizations to this report did not easily lend themselves to a standardized presentation or the application of terminology of uniform meaning. For example, it is obvious from a reading of the report that terms such as "natural resources" and "integrated approach" are given different meanings by the different organizations. Despite this, however, it is hoped that this report will adequately fulfil the needs of the Committee on Natural Resources. It is also hoped that the report, although it does not directly refer to the guidelines for action formulated by the Committee at its second session, 2/ will provide an over-all picture of the implementation of these guidelines by the United Nations system of organizations.

2/ See Official Records of the Economic and Social Council, Fifty-second Session, Supplement No. 5, paras. 16-21.

I. OUTLINES OF WORK PROGRAMMES AND SPHERES OF COMPETENCE

A. UNITED NATIONS

1. Department of Economic and Social Affairs (Headquarters)

(a) Resources and Transport Division

1. The United Nations has been active in the field of natural resources since the very beginning of the Organization, in implementation of broad responsibilities laid down in the United Nations Charter. Over the years, through the adoption of numerous resolutions and the approval of yearly work programmes, various specific tasks have been entrusted to the Secretariat in this field, which includes that of cartography. A collection of the relevant resolutions of the General Assembly and the Economic and Social Council was submitted to the Committee on Natural Resources at its first session (see E/C.7/11 and Add.1). Since then, the Council also adopted resolutions 1572 (L) and 1673 (LII) when it took action on the reports of the Committee on its first and second sessions.

2. In the United Nations, the Resources and Transport Division of the Department of Economic and Social Affairs is the focal point at the executive level for natural resources activities (mineral resources, water resources, energy and cartography). These activities may be divided into mutually complementary operational activities, in substantive support of field projects assisting developing countries, and non-operational activities. The operational activities support some 100 large-scale field projects and many smaller ones, involving about US$ 25 million per year, plus counterpart contributions of about an equal amount, and over 500 international experts. The non-operational activities, in addition to conferences, seminars, panels, research and publications, include the provision of substantive services to the Committee on Natural Resources as well as to the General Assembly, the Economic and Social Council and other intergovernmental bodies when they take up natural resources matters.

3. The over-all objectives and justification of the United Nations programme in the field of natural resources were outlined as follows in the 1973-1974 work programme submitted to the Committee for Programme and Co-ordination at its twelfth session and to the Economic and Social Council at its fifty-third session. 3/

3/ E/AC.51/60 and Corr.1, pp. 84-96. Material in this document should be read in conjunction with documents E/C.7/8 (parts I and II) and E/C.7/19 containing progress reports on the work done including a list of field projects, publications, meetings and relevant statistics, and with documents E/C.7/10 and E/C.7/20 containing the work programmes of the Division, which were submitted to the Committee on Natural Resources at previous sessions.

"The objective of the programme for Natural Resources Development is to promote the rational development and utilization of non-agricultural natural resources, in particular of the developing countries, and to stimulate and facilitate the transfer of new technology and scientific knowledge to the developing countries in accordance with the decisions of the General Assembly, the Economic and Social Council and the Committee on Natural Resources.

"The programme aims to assist the developing countries in the exploration, discovery, evaluation and development of their non-agricultural natural resources by providing substantive support for technical co-operation projects in cartography (including surveying and mapping), energy resources and electrification, water resources and mineral resources (including ocean minerals and deep-sea mining).

"More specifically, the programme is designed to:

1. Discover and identify minerals, groundwater, geothermal and off-shore mineral resources; develop and provide an integrated approach to water resources development (both national and international); assist in the development and utilization of conventional as well as new sources of energy and in the development of power systems and provide basic surveying and mapping needs;

2. Assist developing countries in strengthening their infrastructure for services dealing with natural resources and promote the training of their personnel in these fields;

3. Assist the developing countries in modernizing and strengthening their services for the collection, storage and retrieval of data on natural resources;

4. Provide periodic and special reports on selected subjects in the fields of its competence to the Economic and Social Council, the Advisory Committee on the Application of Science and Technology to Development, the General Assembly, the Committee on Natural Resources and other United Nations organs, as required, and provide substantive servicing to the Committee on Natural Reosurces;

5. Keep abreast of new technological developments with a view to their applicability to natural resources development."

4. As may be seen from the above outline, the focus of the substantive activities of the Division is on the practical development of resources, notably to assist the developing countries. The activities broadly correspond to the priorities laid down in the guidelines for action in the development of natural resources recommended by the Committee on Natural Resources and adopted by the Economic and Social Council in its resolution 1673 (LII). The scope and content of all the

activities are determined by considerations of what natural resources activities are being satisfactorily undertaken outside the United Nations system and whether, within the United Nations system, the United Nations itself is the most efficient one for the performance of these tasks.

5. In the execution of these activities, emphasis is laid on an interdisciplinary and multi-purpose approach and on utilizing the latest technology, as in multi-mineral exploration and development, in the development of different energy sources or water resources for different end uses, or in surveying and mapping for different purposes. This approach is maintained through programme formulation and direction in the Office of Director, tying together the relevant sections of the Division, namely, the Geology and Mining Section, the Water Resources Section (including its functions as Water Resources Development Centre), the Energy Section and the Cartography Section. The spheres of competence of the Division in each of these areas are somewhat more fully described below, together with an indication of the specific activities included in the current work programme and estimated expenditures for each of these areas. The over-all natural resources programme involves estimated expenditures, in thousands of United States dollars, as follows: 4/

	1971	1972	1973	1974
Budget	990.1	1096.8	843.2	852.3
Other	813.0	723.7	908.3	908.3
Total	1803.1	1820.5	1751.5	1760.6

In this, as in other tabulations given below, "budget" refers to the financing essentially of salaries from the regular budget and "other" refers to extra-budgetary financing mostly of salaries for Headquarters technical advisers in the Division. It should be noted in this connexion that operational activities, which fall outside the normal programming under the regular budget, constitute a major part of the activities of the Resources and Transport Division. The figures do not include field expenditures which rose in this area from $22.7 million in 1971 to an estimated $23.5 million in 1972 and are expected to increase further in response to demands for assistance from developing countries. As of 31 December 1971, the Resources and Transport Division was providing substantive supporting services for 101 large-scale or UNDP (Special Fund) projects and many more small-scale projects in various fields of natural resources development, including surveying and mapping, geology and mining, water resources, energy and electricity. Eight large-scale projects in the field of natural resources were added in January 1972, namely in Brazil, Burma, Haiti, Nicaragua, Somalia, Turkey and Uruguay, and a substantially larger number of such projects to be similarly executed by the Division were approved by the UNDP Governing Council in June 1972.

4/ Reference to "dollars" ($) indicates United States dollars, unless otherwise stated.

Geology and mining

6. The main thrust of the United Nations programme in the field of geology and mineral resources development has been in direct mineral exploration surveys with associated training and institute-strengthening objectives. Taken in orthodox sequence, the following activities have all been vigorously promoted in work programmes of the United Nations: the organization of geological survey and mineral resources departments; geological mapping; photogeology; mineralogy/petrology; mineral exploration, utilizing all modern methods such as geochemical prospecting and exploration geophysics (airborne, ground and off-shore); diamond and other drilling; analytical chemistry and assaying; economic feasibility studies; mining; mineral processing and metallurgical extraction; and, in addition, mining legislation. Where requested, assistance is provided to Governments in their negotiations with the private sector for mining development of ore deposits that have been discovered.

7. The United Nations has endeavoured to amass the body of experience necessary to sustain efficient field programmes in the developing countries. Considering that virtually all UNDP-assisted projects in geology and mineral resources development are executed directly and without recourse to subcontracts other than for particularly specialized operations, such as airborne geophysical surveys, it will be appreciated that the Resources and Transport Division must count on a considerable technical staff to service these activities. Eleven full-time technical advisers at United Nations Headquarters cover virtually the entire field, and close contacts are maintained with a large body of consultants of international reputation, as well as with the senior technical staffs of geological and mineral resources organizations in the more developed countries. The sum total is a comprehensive body of expertise which, if necessary, can be provided to developing countries on an urgent basis. This technical advisory capacity is available to assist Governments in defining their development needs, formulating programmes to meet these needs and providing the necessary technical support during project execution.

8. Although in terms of the workload operational activities are predominant in the work programme of the Resources and Transport Division because of the large number of UNDP-assisted projects being executed by the United Nations, non-operational activities are of considerable importance, as they are designed to meet and anticipate the requirements of the operational activities, which in turn reflect the technical assistance needs of the developing countries. Thus, for example, ad hoc working groups convened to discuss such subjects as new geological concepts as applied in the exploration of mineral deposits and recent advances in mining and processing of low-grade mineral deposits are forward-looking and provide guidelines for project formulation and execution.

9. In essence, virtually all projects executed in the field of geology and mining assist in the organization and strengthening of government institutions dealing with geology and mining resources development, and the training of national personnel at all levels is an integral part of such projects. A number of projects, however, have as their primary objective the establishment or strengthening of institutes, while concurrently carrying out the geological or mineral exploration or other field

surveys required by the recipient country's development programme. Mineral exploration programmes utilizing modern methods, per se, constitute the largest single operational sector, since the direct search for ore deposits, while simultaneously training national personnel in the modern methods employed, has been the prime motivation for the bulk of UNDP-assisted projects executed. Mineral processing activities have figured in several of the mineral exploration projects executed, since mineral deposits located through these programmes cannot be evaluated without establishing that the ore can, in fact, be beneficiated economically. Thus, processing must be taken into account in establishing economic feasibility. There are, however, a number of projects where mining and mineral processing form the major part of operations, and which are not necessarily tied to exploration activities but more often designed to meet the needs of an existing mining industry.

10. The emphasis placed by certain developing countries on applied rather than purely scientific university training has resulted in a few projects being executed jointly with national universities, usually in close co-operation with national geological or mines organizations which will be employing a number of the specialists once they are trained. This training has been mostly in mineral exploration techniques, given at the post-graduate level or after a grounding in basic sciences has been established in undergraduate courses. It combines academic course work with concentrated field training in the physical, geological and metallogenetic environment of the student's home country.

11. The specific activities which are included in the current work programme of the United Nations in the area of geology and mining and which are all, except for the last item, in the category of non-operational activities may be summarized as follows:

(a) Development of guidelines for evaluating the prospects of mineral processing in developing countries;

(b) Determination of the impact of the changing patterns of mineral supply and demand on mineral development;

(c) Development of guidelines for financing mineral development projects;

(d) Establishment of criteria for the exploitation of low-grade or marginal ores in accordance with recent advances in technology;

(e) Assessment of the effects of mining and mineral processing on the environment and development of methods to curb environmental pollution resulting from mining and mineral processing;

(f) Application of advanced mining technology in developing countries;

(g) Promotion of the application of hydrometallurgical processes in mineral resources development;

(h) Preparation of a handbook on mineral taxation policy;

(i) Improvement of practices in the negotiation and drafting of mining development agreements;

(j) Encouragement of the development of non-metallic minerals in developing countries;

(k) Provision of substantive support for technical co-operation field projects.

12. The estimated expenditures, in thousands of United States dollars, for the above components of the work programme (excluding field expenditures) are as follows:

	1971	1972	1973	1974
Budget	192.8	241.1	207.9	209.4
Other	360.5	308.4	340.7	340.7
Total	553.3	549.5	548.6	550.1

Water resources

13. The activities of the Water Resources Section of the Division relate to the exploration, development, integrated utilization and management of water resources, both through field operations, and the dissemination of knowledge (by seminars, symposia, panels of experts, publications), in co-operation with other organizations as appropriate in this complex field. The terms of reference have been set out in a number of Economic and Social Council resolutions, and, in particular, in resolution 1033 D (XXXVII). This area of competence includes many technical, institutional, legal, social and economic aspects, and the staff, accordingly, include water economists, lawyers, engineers and hydro-geologists.

14. The activities of the Division are aimed at integrated water management and are focused on assistance in the development of a framework for establishing water requirements and availabilities, in order to identify allocation priorities, to formulate suitable policies and to map out exploration and development activities. The Division fosters the integrated development and use of water resources and an efficient multipurpose use of those resources, including all possibilities for water-supply augmentation and conservation. The Division is also charged with primary responsibility for such activities as hydropower development and navigation.

15. To assure the supply of water of an adequate quantitative and qualitative standard when and where required, the activities of the Division centre upon surface and groundwater resources exploration and development, from general reconnaissance, including mapping, aerial reconnaissance and geological interpretation, to actual exploration, including drilling in the case of groundwater, and in certain cases, pilot development schemes. The activities

carried out in the reconnaissance and exploration stage take advantage of the expertise of the Division in cartography and geology through the Division's Cartography and Geology and Mining Sections. In fact, where geological conditions warrant, the use of the Division's expertise in geology is maximized by carrying out joint mineral and groundwater exploration projects.

16. The Division examines all possible sources of water for an economic solution to the problem of meeting water demands. Thus, it has devoted a great deal of attention to desalination including geothermal desalination, as a means of increasing the fresh water supply, in compliance with specific Economic and Social Council resolutions giving legislative support to this and other tasks and recognition to the need to keep abreast of further breakthroughs in technology which might increase the efficiency of existing systems or might bring about new methods of increasing water supplies.

17. Attention is given to the integration of water-supply development into systems, including the possibilities of interbasin transfer and the development of water grids. All these activities involve the use of advanced technologies including river training and coastal engineering.

18. The planning and management aspects relate to the socio-economic, legal and institutional aspects of water resources development and use, including demand forecasting, allocation problems and the conservation of water resources, efficient utilization, avoidance of waste, recycling possibilities and the treatment of contaminated waters for further use.

19. Since practical training and institution-building are essential in the development of the required expertise and institutions in the field of water resources development, the Division gives assistance in the creation or strengthening of applied research and engineering design institutes (hydraulic research centres, dam design institutes and the like), of surface and groundwater services and of administrative infrastructure, as well as of institutes for water economics and legislation. The training of personnel is achieved through field projects and, indirectly, through seminars, symposia and publications.

20. The integrated multi-purpose approach to water resources development, use and management is of a more complex nature in the case of international water resources, and the Division pays particular attention to the legal, economic, institutional and technical aspects of those resources.

21. The specific activities that are included in the current work programme in this area and that are all, except for the last item, in the category of non-operational activities may be summarized as follows:

(a) Preparation of guidelines for flood damage prevention;

(b) Preparation of guidelines on waste water processing for subsequent use;

(c) Assessment and dissemination of data on the groundwater resources of Latin America;

(d) Reciprocal provision of information and co-ordination among the United Nations organizations in water resources development, including the provision of services to ACC Sub-Committee on Water Resources Development and joint reports;

(e) Preparation of guidelines on the application of water grid systems;

(f) Preparation of guidelines on the optimization of water resources development programmes;

(g) Preparation of guidelines on the survey and exploration of groundwater in crystalline rocks;

(h) Assistance in the application of the theory of systems and modelling in groundwater exploration in developing countries;

(i) Assistance in the application of water desalination;

(j) Provision of guidelines and assistance in water administration and water legislation;

(k) Preparation of United Nations water conference;

(l) Provision of substantive support for technical co-operation projects.

22. The estimated expenditures (excluding field expenditures), in thousands of United States dollars, for the above components of the work programme are as follows:

	1971	1972	1973	1974
Budget	223.0	227.6	154.7	159.4
Other	287.5	227.2	305.0	305.0
Total	510.5	454.8	459.7	464.4

Energy

23. The activities of the Division in the energy field have encompassed all energy sources, both conventional and new sources since, as the Economic and Social Council recognized in its resolution 653 (XXIV) "sources of energy, conventional and non-conventional, cannot be considered in isolation from one another in relation to economic and social development". Throughout the years, the Council has called for increased assistance to developing countries in the exploration, development and utilization of conventional sources of energy such as coal, petroleum and gas and has repeatedly stressed the importance of new or non-conventional sources which should be evaluated in the light of new technological conditions and supply/demand situations. The interrelationship among the various energy resources is increasingly recognized at the country level particularly in efforts to create machinery for the co-ordination of energy policies.

24. Nuclear power is the only energy source that has been entrusted to a specialized body of the United Nations system, namely, IAEA. The Division, however, has continued to co-operate with the Agency both in the preparation of studies and in field projects so that Governments of developing countries can receive a full evaluation of their energy potentials and of the best methods of meeting their requirements.

25. In addition to encompassing all energy sources, the work of the Division has also covered all the stages of energy resources exploration, production, transportation, processing and refining, marketing and distribution, including such associated subjects as technology, training of personnel, institution building and related legislation and administration. The object has been to develop an integrated approach to natural resources development and use. Advice and assistance have thus been provided from the exploration stage right through to the point of utilization of energy products wherever these were used for the provision of energy, be it in transportation, power generation, industrial and/or household use.

26. Since energy resources usually go through further processing (as, for example, petroleum refining, coking of coal or gas processing) after their production from the mine, the oil field, the gas field or the geothermal field, the work has concerned each stage up to the point where these resources in fact become useful energy products. In the case of hydrocarbons, for instance, petroleum products used as fuels directly compete with hydropower, geothermal power and the like, and it has been customary in the energy field to distinguish between primary and secondary energy with both being considered natural resource products; moreover, refineries were originally designed to improve the quality of fuels only and, even today, the bulk of all refinery products are energy products.

27. In some instances, the process of transformation of primary energy resources into useful energy products for consumption is accompanied by the production of non-energy products. In such situations, United Nations assistance has been supplemented with assistance from other bodies such as UNIDO.

28. The purpose of energy resources exploration and development is to meet either domestic or export demand, and conditions in the market affect both exploration and investment decisions. Comprehensive knowledge of the energy situation at the national and global levels is required to advise on the appropriate decisions that will minimize costs and maximize benefits.

29. The Division has provided assistance to practically every developing country in some aspect or other of the exploration, development, processing, refining and marketing of conventional sources of energy, including electric power. In the 1960s, it began the application of technology for geothermal resources development in several developing countries, particularly, those with scarce indigenous conventional energy resources.

30. Field projects under the various technical co-operation programmes have been supplemented by the preparation of studies and reports and the organization of seminars, conferences and panels of experts on the technical, economic, legal and administrative aspects of energy resources development.

31. The specific activities that are included in the current work programme in the energy field and that are all, except for the last item, in the category of non-operational activities may be summarized as follows:

(a) Provision of a framework for the appropriate examination of measures for co-ordinated energy policies based on energy requirements (energy planning, policy and projections);

(b) Provision of a framework and assistance in the development of petroleum and natural gas;

(c) Provision of assistance in the identification and development of geothermal resources;

(d) Assistance in the identification and development of solid fuels (coal and lignite resources);

(e) Exchange of experience on new technology for non-conventional energy resources and encouragement of the development of low-cost indigenous energy (oil shales, tar sands and solar energy);

(f) Provision of guidelines and assistance in the development and planning of electric power;

(g) Provision of substantive support for technical co-operation projects.

32. The estimated expenditures, in thousands of United States dollars, for the above components of the work programme (excluding field expenditures) are as follows:

	1971	1972	1973	1974
Budget	240.9	251.6	220.6	225.4
Other	101.5	125.9	163.7	163.7
Total	342.4	377.5	384.3	389.1

Cartography

33. The competence of the Cartography Section, whose work is an integral part of the natural resources programme of the United Nations, is defined in Economic and Social Council resolution 131 (VI) "Co-ordination of cartographic services of the specialized agencies and international organizations" and resolution 261 (IX). Part A of the latter resolution in its five instructions to the Secretary-General authorized the establishment of the cartographic office (now the Cartography Section), the calling of regional meetings on cartography, the continuation of efforts in the co-ordination of plans and programmes of the United Nations and the specialized agencies in the field of cartography and the publication of periodic summaries on cartography. Part B of the resolution requested action by the Secretary-General which, eventually, under resolution 412 (XIII) transferred to the Cartography Section the functions of the Central Bureau of the International Map of the World on the Millionth Scale (IMW).

34. The definition of cartography as given in Modern Cartography 5/ is fundamental to an understanding of the extent of the authority given to the Cartography Section in the basic resolutions. It reads: "Cartography is considered as the science of preparing all types of maps and charts and includes every operation from original surveys to final printing of copies. The types of maps and charts included are: (a) topographic maps; (b) geologic maps, soil maps, vegetation maps, cadastral maps, hydrologic maps, hydrographic charts and aeronautical charts, all of which are prepared upon a topographic map base; and (c) office-compiled maps showing the location, extent and character of physical, economic and social phenomena."

35. The specific activities which are included in the current work programme in this area and which fall, except for the last item, in the category of non-operational activities,may be summarized as follows:

(a) Stimulation of international co-operation in cartography;

(b) Exchange of technical knowledge and experience in surveying and mapping;

(c) Assessment of world cartographic needs and evaluation of the value of new technologies for developing countries;

(d) Provision of substantive support for technical co-operation field projects.

36. The estimated expenditures, in thousands of United States dollars, for the above work programme components (excluding field expenditures) are as follows:

	1971	1972	1973	1974
Budget	88.9	109.3	44.5	42.5
Other	36.5	34.1	69.1	69.1
Total	125.6	143.4	111.6	111.6

5/ United Nations publication, Sales No. 49.I.19.

Programme formulation and direction

37. The objectives of this programme component are: (a) to provide over-all policy guidance and direction for the solution of management problems; (b) to co-ordinate and guide research studies; (c) to provide co-ordination and guidance in the substantive execution of technical co-operation activities; and (d) to foster an interdisciplinary and multi-purpose approach in all studies and activities.

38. The technical co-operation aspects require an interdisciplinary approach to development problems of non-agricultural natural resources and the application of the latest technological developments to their solution with the appropriate economic evaluations. A publication entitled Natural Resources Forum is issued periodically. A small reference centre provides documentation as needed, calls attention to developments in specific fields and assists in preparing needed statistical data.

39. Most of the substantive services of the Committee on Natural Resources are provided under this programme component. This component also provides for special undertakings such as follow-up work to the United Nations Conference on the Human Environment contributions of the Division to the World Population Conference and the establishment of the United Nations revolving fund for natural resources exploration, as well as projections of natural resources.

40. The estimated expenditures, in thousands of United States dollars, for the above programme components are:

	1971	1972	1973	1974
Budget	215.6	256.8	206.4	204.0
Other	27.0	28.1	29.8	29.8
Total	242.6	284.9	236.2	233.8

(b) Division of Public Finance and Financial Institutions

41. The Division of Public Finance and Financial Institutions of the Department of Economic and Social Affairs reviews various aspects of arrangements between foreign investors and host developing countries in the field of natural resources, with a view to adumbrating trends concerning the forms and conditions of the transfer of operative technology, profit-sharing and control. In accordance with paragraphs 5, 6 and 7 of General Assembly resolution 2692 (XXV), a report on the subject of permanent sovereignty over natural resources was prepared for the Economic and Social Council at its fifty-third session (see E/C.7/33).

2. Economic Commission for Europe (ECE)

42. The sphere of activities of the Economic Commission for Europe in the field of natural resources is described below under the headings of energy, water problems and minerals.

Energy

43. The work of the ECE secretariat on general energy questions has proceeded under the guidance and supervision of the Commission itself and is based on a number of resolutions and other decisions which the Commission has taken since its eleventh session.

44. At its twenty-seventh session in April 1972, the Commission approved the decision of the Senior Economic Advisers to ECE Governments to start an examination of long-term problems with respect to basic materials and energy in the framework of the economy as a whole (Commission decision F (XXVII)), and requested the Executive Secretary to bring to the attention of the Commission significant new developments in the energy sector. These studies on general energy problems being prepared by the secretariat, at the Commission's request, include an analysis of the relationship between gross domestic product and energy consumption in the countries of the ECE region.

45. The Coal Committee was established by ECE in 1947. Under its terms of reference, the Committee examines problems concerning the economic, technical and scientific aspects of the coal industry. To this end, the Coal Committee has set up a number of subsidiary bodies to deal with problems arising in respect to trade, productivity and management, statistics, the utilization and preparation of solid fuels and the exchange of exeprience among national mining research institutes.

46. Specific activities in the current work programme of ECE include the following:

(a) An annual study on the coal situation and its prospects;

(b) Studies on short-term and long-term problems of the coal market, to be carried out by the Committee's Working Party on Coal Trade;

(c) Studies on selected problems in the fields of statistics, mining and utilization and preparation of solid fuel, to be undertaken by groups of experts;

(d) Periodic review of scientific research in the coal industry, to be carried out by a meeting of directors of national mining research institutes.

47. The Electric Power Committee was established by the Commission in 1947. Under its terms of reference, the Committee provides a forum for discussion and the exchange of information regarding electric power problems and is empowered to initiate studies and make recommendations on the best utilization of available resources and on the best means of effecting the co-ordinated development of electric power. The Committee has set up subsidiary bodies dealing with such problems as those of planning and operating large power systems and electric power stations, the relationship between electricity and the environment, distribution and rural electrification.

48. Specific activities in the current work programme of ECE include the following:

(a) The triennial study of the electric power situation in Europe;

(b) Studies on the long-term prospects of the electric power industry in Europe, the planning and operation of large power systems, the integration of nuclear power stations in electric power systems, the relationship between electricity and the environment, the planning and operating of thermal power stations and hydroelectric schemes, the distribution of electric power and rural electrification;

(c) Studies on selected legal or administrative questions and statistical problems.

49. The activities of ECE in the field of gas are carried out by the Committee on Gas which examines problems concerning the economic, statistical and technical aspects of the production, transport and utilization of gas, both natural and manufactured. The Committee has set up subsidiary bodies to deal with such questions as the transport and storage of gas, preferential uses of gas and gas statistics.

50. Specific activities in the current work programme of ECE include the following:

(a) The triennial review of the gas situation in Europe and its prospects and the annual analysis of natural gas markets in Europe;

(b) Studies on selected problems relating to the use and distribution of gas, the transport and storage of gas, and gas statistics, to be carried out by groups of experts;

(c) Review by an ad hoc meeting of problems in the evaluation and exploitation of natural gas resources.

Water problems

51. Work on problems of water pollution control started under the auspices of ECE as early as 1956. Subsequently, other problems in the field of water resources were added in the programme of work of the Commission and its subsidiary organs. At present, activities in this field are carried out under the auspices of the Committee on Water Problems which was established by the Commission in 1967 with the task of initiating, carrying out and co-ordinating studies on the rational utilization of water resources and water pollution control, as well as of exchanging information and experience on problems concerning the formulation and application of governmental water policies.

52. Specific activities in the current work programme of ECE include the following:

(a) Review and analysis of the existing situation and future prospects for water resource use and development;

(b) Review of the relevant work done and planned in other bodies of ECE, under other United Nations programmes and in other international organizations operating in the ECE region;

(c) Selected studies and other activities for the promotion of water resource utilization surveys and their international comparability, to be carried out by the Ad Hoc Group of Experts on the Survey of Water Resources;

(d) Studies of selected problems in water pollution control;

(e) Studies of selected problems of governmental policy related to the formulation and administration of water management plans;

(f) Studies on special aspects of water quality and quantity.

Minerals

53. The terms of reference of the Steel Committee which was set up by the Commission in 1948 include, inter alia, the examination of the supply position with regard to the principal raw materials and equipment of the iron and steel industry. Pursuant to this mandate, the Committee has been considering the problems related to the production and consumption of, and trade in, iron ore and manganese ore as raw materials for iron and steel production. Reference may be made in this connexion to a study entitled "The world market for iron ore", (ST/ECE/STEEL/24), published in 1969, which covers both the production and reserves of iron ore and the prospects for iron ore production in 1975 and 1980, on the basis of an assessment of economically exploitable iron ore resources.

54. A seminar on the direct reduction of iron ore - in its technical and economic aspects - was held at Bucharest, Romania, from 18 to 23 September 1972.

3. Economic Commission for Asia and the Far East (ECAFE)

55. In accordance with its terms of reference, the Commission has, since 1947, been active in the development of natural resources through its Regional Conference on Water Resources Development, as well as through the Committee on Industry and Natural Resources and its subsidiary bodies, the Sub-Committee on Energy Resources and Electric Power, the Sub-Committee on Mineral Resources Development (SCMRD) and the Working Party of Senior Geologists (WPSG). The two sub-committees are to be merged into a Conference on Geology and Mineral Resources Development for the ECAFE region. In the secretariat, the Natural Resources Division has the responsibility for development of water, mineral, energy and electric power resources.

Water resources development

56. The four major components of ECAFE's current work programme in this field are: 6/

(a) Planning and development of water resources;

(b) Application of science and technology to water resources development;

(c) Water resources development of international rivers;

(d) Measures for the mitigation of flood control damage.

57. With regard to the last two, special mention should be made of the catalytic role the Commission has been playing in the promotion of international co-operation in major regional projects such as the development of the Mekong River basin and, more recently, the establishment of the inter-governmental Typhoon Committee for minimizing typhoon damage. The lower Mekong project, in particular, has grown from a mere reconnaissance survey of the lower Mekong basin in 1951 to a comprehensive plan for the integrated development of the entire lower part of the river basin, with more than $200 million pledged to the Committee for the Co-ordination of Investigations of the Lower Mekong Basin and projects sponsored by it. The inter-governmental Committee has drawn up a programme to establish additional forecasting and warning activities.

58. In general, the activities of the ECAFE secretariat in the field of water resources development are directed towards:

(a) Identification of problems of importance to the countries of the region and to the region as a whole, through the organization of the biennial Regional Conference on Water Resources Development, which is also charged with the consideration of ECAFE's biennial programme in this field;

6/ See also Official Records of the Economic and Social Council, Fifty-third Session, Supplement No. 4, pp. 127-129.

(b) Conisderation by ad hoc working parties or panels of experts of the problems thus identified, with a view to arriving at solutions or recommendations for concerted action;

(c) Provision of advisory services by regular staff members, regional advisers and consultants;

(d) Determination of fields in which regional or subregional co-operation would be beneficial and the establishment of intergovernmental committees for promoting concerted action in those fields;

(e) Organization of training seminars for professional and technical personnel in subjects of particular interest to countries of the region.

59. The lack of trained personnel has been found to be one of the major constraints in the development of water resources in the region. Accordingly, a number of regional training seminars have been organized in this area in co-operation with WMO and UNESCO. The scope of training has recently been further widened with the organization of three roving seminars which have provided in-service training for groups of technicians and professional officials, totalling more than 1,500, in various aspects of water resources development.

Energy resources development 7/

60. The two main projects in the work programme of the ECAFE Sub-Committee on Energy Resources and Electric Power are: electric power development and planning and energy resources development. The matters considered by the Sub-Committee, apart from the regular review of power development, may be grouped into the following broad topics: rural electrification; standardization; costs of electricity and electricity tariffs; safety regulations; hydro-power, thermal power, nuclear power and integrated systems; utilization of electrical energy; use of computers in electricity supply; and energy resources surveys.

61. In accordance with recommendations of the Sub-Committee, ad hoc group meetings are held (working party, working group, study tour or regional seminar) dealing with such subjects as the assessment of hydro-electric potentials; the utilization of wood poles for power line support; electricity statistics; the role of electric power in industrialization; and load dispatch techniques. Furthermore, a panel of experts on rural electrification provides the developing countries with practical advice in this area.

62. The secretariat has, since 1951, issued an annual review entitled Electric Power in Asia and the Far East, as well as a number of publications on various subjects, including: rural electrification; manuals on management and cost accounting for the electricity supply industry; techno-economic studies on thermal stations; boiler codes; guidelines for energy surveys; and an energy atlas of the region.

7/ Ibid., pp. 97-99.

Mineral resources development

63. The five major components of ECAFE's current work programme in this area are: 8/

(a) Development of petroleum and natural gas resources;

(b) Promotion of the exploitation and utilization of mineral deposits;

(c) Regional, geological and specialized maps and related activities;

(d) Off-shore prospecting for mineral resources;

(e) Development of national geological services.

64. The ECAFE Working Party of Senior Geologists and the Sub-Committee on Mineral Resources Development provide the means for establishing guidelines to fulfil the needs of the developing countries of the region in the fields of geology and mineral resources development. Their recommendations attract substantial assistance for many national, subregional and regional projects from other United Nations agencies, as well as bilateral assistance from industrialized countries for national projects and multilateral assistance to the developing countries by contributing to the secretariat the services of experts in specialized fields.

65. The secretariat maintains contact with international non-governmental organizations to introduce internationally recognized standards in the developing countries and to advance their projects in the ECAFE region and promotes regional and multi-national projects for groups of countries with common interests. Projects of this kind undertaken thus far include the co-ordination of the compilation of regional geological and related specialized maps; the organization of the Working Group for Stratigraphic Correlation in the ECAFE Region; the promotion of a tin industry development and research centre for South-East Asian countries; and the organization of an expert mission which visited the developing countries of the ECAFE region in 1971 to determine the need for a regional mineral resources development centre.

66. Realizing the potentials, particularly for petroleum, in the off-shore areas of oil-deficient countries in eastern Asia, as well as for other mineral resources on the marine shelves, the secretariat promoted the establishment of the Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Off-Shore Areas (CCOP), to which it provides substantive support. The Committee now comprises eight member countries of ECAFE in eastern Asia and has recently received the support of UNDP.

67. In view of the outstanding success of CCOP, the secretariat organized, in May 1969 and July 1971 respectively, preparatory meetings for similar bodies for countries adjoining the Indian Ocean and for those in the South Pacific. The inaugural session of the South Pacific body will be held in 1972.

8/ Ibid., pp. 101-103.

68. During the past two decades, through the medium of study tours, seminars and symposia, ECAFE has been responsible for introducing and promoting the use of modern methods and techniques in the field of geological survey and mineral resources development. The relevant activities so far undertaken in this area include study tours in Europe and the Union of Soviet Socialist Republics concerning mineral resources development and in Australia concerning the development and utilization of lignite resources; seminars on airborne methods of geological survey and geophysical prospecting, geochemical prospecting techniques, exploration methods for mineral raw materials for fertilizers, the development and utilization of natural gas resources, mining legislation and administration, petroleum legislation with particular reference to off-shore operations; and a series of symposia on the development of petroleum resources.

69. The publication by ECAFE of its Mineral Resources Development Series, provides the main source material for information on the geology and mineral resources of the region which, in turn, serves to attract the interest of outside capital to the mineral potentials of the region. Similarly, the publications of CCOP have been a major factor in stimulating the taking up of new concessions on the marine shelves of eastern Asia from 1969 onwards.

70. Direct technical advisory services to the developing countries are provided in many fields through regional advisers provided under United Nations technical assistance programmes, specialists provided on a non-reimbursable basis by the Governments of industrialized countries, and by ECAFE staff.

4. Economic Commission for Latin America (ECLA)

71. The secretariat of the Economic Commission for Latin America has been working since 1956 in collaboration with different government institutions in the Latin American countries on a variety of projects connected with the utilization and conservation of natural resources, in compliance with several ECLA resolutions.

72. These resolutions cover a wide range of activities, from research and advisory and training services connected with natural resources in general, to specific projects involving energy and water resources. Recent resolutions have also requested the secretariat to assist countries in regional planning studies and to help in developing the integrated management of natural resources.

73. The work currently undertaken by ECLA in the natural resources field may be divided as follows: (a) studies and research of general interest; (b) short-term technical assistance missions at the request of Governments; (c) seminars; (d) collaboration with other agencies. As these activities are concerned principally with economic and social issues, technical aspects are examined only in so far as they are essentially bound up with these issues.

74. Studies, research and a good many of the technical assistance missions cover, among other things, the selective compilation of data, the examination of current demand, its evolution and future prospects (markets), a critical analysis of the work done, financial requirements and forms of financing, and current legislation

and administrative organization, with a view to improving planning systems and identifying fields where intensive technical assistance is required on a long-term basis. Guidance is provided in matters that fall within the competence of UNDP. Other short-term technical assistance missions involve specific consultations on particular projects or programmes. A joint working group has been set up, consisting of officials from ECLA, WMO and the Pan American Sanitary Bureau, as well as regional advisers provided by the Office of Technical Co-operation of the United Nations Secretariat for the purpose of promoting natural resources development. Nineteen professionals, in Santiago and the Mexico Office of ECLA, are devoting priority attention to water, energy and, more recently, mineral resources. Most of these officials are regional advisers who are concerned principally with operational tasks.

75. The main activities included in the programme of work of ECLA for 1973-1974 in the field of natural resources are as follows:

(a) Research on the development, use and conservation of energy, water and mineral resources in the Latin American countries;

(b) Short-term operational technical assistance activities carried out by regional advisers;

(c) Preparation of the energy and mining sections of the Economic Survey of Latin America;

(d) Regional appraisal of the progress in achieving the goals of the International Development Strategy in so far as natural resources are concerned;

(e) Participation in the activities that the Commission will carry out with regard to the human environment, continuing the work already done in the preparation of the United Nations Conference on the Human Environment.

76. In addition to the regular activities listed above, some specific projects (research, meetings and so on) are envisaged for the period covered by this programme, and some will extend beyond 1974, as follows:

(a) Energy:

(i) Periodic review of the progress and prospects of the sector with regard to the objectives of the International Development Strategy;

(ii) Assistance to Governments in sector evaluation for policy-making purposes;

(iii) Promotion of improved planning for electric energy development through research, advisory and seminar activities;

(iv) Forecasts of the petroleum requirements of Latin America in 1980;

(v) Integrated development of the electric energy sector in Central America.

(b) Water resources:

(i) Over-all view of water resources in Latin America, the problems involved in their use and control, possible objectives and strategy instruments for the 1970s;

(ii) Review by expert group of the above study;

(iii) Operational research and mathematical models for the development of hydrographic basins;

(iv) Country studies on water resources;

(v) Plans for the development of the most important hydrographic basins in Central America.

(c) Mineral resources:

(i) Problems, goals and strategy instruments in the development of the Latin American mining sector in the 1970s.

5. Economic Commission for Africa (ECA)

77. Under its terms of reference, the Economic Commission for Africa assists in the formulation and development of co-ordinated policies as a basis for practical action promoting the economic, social and technological development of Africa. To this end, the Commission is empowered (a) to make or sponsor investigations and studies, and disseminate the results to member States; (b) to perform such advisory services as the countries of the region may desire; and (c) to make recommendations directly to Governments on any matter within its competence.

78. At the first session of the Commission, concern was expressed over the lack of comprehensive knowledge of the natural resources of the region. African Governments were encouraged to increase their quantitative, technical and economic knowledge of the natural resources of their own countries, and the broad lines of the activities to be undertaken by the secretariat in this field were laid down.

79. In the field of water resources, the activities of the Commission have centred mainly on comprehensive planning of the inventory and the development of national water resources and of international river basins; hydrological networks; institutional aspects of water resources development; manpower, training and research; and the collection of hydrological, economic and other water resources data and their dissemination. As regards mineral resources, the Commission at its first session asked the secretariat to assist in the preparation of a bibliography of surveys already carried out, and in identifying the gaps in this area to provide the basis for industrial and agricultural development. The aim of subsequent

activities in this field has been, in general, to promote the exploration, exploitation and utilization of mineral deposits in African countries. Similarly, in the field of energy, the over-all objective of the Commission's activities has been to encourage the exploration, systematic planning and development of energy resources in the region and, where appropriate, to promote multi-national co-operation in their exploitation and use.

80. The programme of work (operational and non-operational) of the Commission in the field of water, mineral and energy resources may be summarized as follows:

81. Activities in water resources:

(a) Advisory services to Governments regarding the planning of the inventory and of the development of water resources;

(b) Promotion of co-ordinated action by Governments in the development of international drainage basins;

(c) Advice on, and promotion of, water resources data collection, including hydrological networks;

(d) Promotion of water resources institutes for training, research and development in the field of water resources;

(e) Periodic review of water resources planning and plan implementation;

(f) Publications and the organization of training seminars and working parties in water resources development.

82. Activities in mineral resources:

(a) Assistance to member States in the formulation of national mineral development policies;

(b) The provision of advisory services on the legal and economic aspects of mineral exploration and exploitation;

(c) The promotion of co-operation between neighbouring States in respect of the exploration and exploitation of mineral resources in border areas and off shore;

(d) Studies, assembly and analyses of information;

(e) The convening of a conference on the petroleum industry in Africa;

(f) The provision of assistance to Governments in order to strengthen existing educational institutes to serve multi-national needs in geology and mining;

(g) The promotion of the establishment of mineral resources development centres.

83. The Commission also serves as a documentation centre for collecting and disseminating information on mineral development production and trade; for studies on world trends in the demand for minerals; for information on Africa's export position as regards raw materials for the fertilizer industry and the metallic industries; and on the establishment of mineral resources development centres.

84. In energy, the Commission's programme of work covers:

(a) The preparation of an inventory of energy resources, the provision of training facilities and the assessment of needs, and the promotion of energy development;

(b) The preparation of documentation on energy and energy development programmes for multi-national intergovernmental groupings;

(c) The collection and dissemination of information on the development of various forms of energy and the convening of an African conference on energy;

(d) The comparative study of the experience of African and other developing countries in rural electrification and the major factors affecting its development;

(e) The provision of advice on the establishment of national and multi-national institutes for the study of various sources of energy, including solar energy.

6. United Nations Economic and Social Office in Beirut (UNESOB)

85. The United Nations Economic and Social Office in Beirut, in co-operation with the Governments of the region, and within the limits of available resources, plans to initiate studies in 1973 and 1974 in order to demonstrate the dangers of the irrational exploitation of non-renewable natural resources and to discuss the policy implications involved in correcting the existing situation, bearing in mind the present and future demands and development needs of the countries concerned. The need for the integration of information on natural resources will also be stressed and the possibilities of inter-country co-operation for a more efficient exploitation of natural resources will be explored (see ESOB/D/72/1, pp. 59, 76).

36. In view of the proposed United Nations water conference and the priority which the Governments of this region attach to the development of their water resources, the following specific studies on water are planned (see ESOB/D/72/1, p. 7):

(a) A regional study regarding data and information on water resources, water use, water planning and related activities by Governments. The need for the exchange of information, especially that relevant to inter-country co-operation, on the utilization and development of water resources will be highlighted;

(b) A study of the administrative bodies in various countries that are charged with responsibility for water development activities. National policies regarding water resource utilization and development will be adequately covered.

87. These studies are in line with the recommendations contained in Economic and Social Council resolutions 1287 (XLIII) and 1572 (L).

88. In the Agriculture and Natural Resources Unit, there are two professional posts which are filled by FAO staff members outposted to UNESOB: an agricultural economist and an associate expert in economics. They will work closely with other United Nations experts or staff in the preparation of these studies.

7. United Nations Conference on Trade and Development (UNCTAD)

89. As an organization whose principal function is to promote international trade with a view to accelerating economic development, particularly that of the developing countries, the United Nations Conference on Trade and Development (UNCTAD) is involved in problems affecting international markets for minerals and metals (among other commodities, including semi-manufactured and manufactured articles) and, hence, affecting the scope for the growth in developing countries of export-oriented industries based on mineral and other natural resources.

90. Since the scope for the development of natural resources, especially in the developing countries, depends to a great and often dominant extent on the opportunities for exporting the resultant unprocessed, semi-processed or processed products to markets in the rest of the world - particularly those in the industrialized countries - the whole range of activities of UNCTAD has an important bearing on natural resources development. Thus, apart from the Committee on Commodities, whose activities relate most closely to natural resources development, the activities of the Committees on Manufactures, Shipping, Invisibles and Financing Related to Trade, Transfer of Technology, and the Special Committee on Preferences - as well as the activities of the Trade and Development Board, to which all the UNCTAD specialized committees report - have a significant bearing on the development of the output of industries based on natural resources.

91. The terms of reference of the UNCTAD Committee on Commodities, laid down by the Trade and Development Board, in its decision 7 (I), include the promotion of integrated policies in the commodity field, the continuing review of the market situation of various primary commodities, the promotion of international stabilization measures and international commodity agreements as appropriate and, generally, the consideration and recommendation of measures designed to stimulate a steady and dynamic growth in exports of primary commodities from developing countries to industrialized countries.

92. As far as specific activities in relation to problems of international trade in minerals and metals are concerned, UNCTAD's interest, among other questions of international trade and development, derives basically from General Assembly resolution 1995 (XIX), establishing UNCTAD as an organ of the General Assembly; the terms of reference of the Committee on Commodities referred to above; and the

decisions of the first, second, and third sessions of UNCTAD. Part G of UNCTAD resolution 16 (II) recognized that, among certain other commodities, iron ore, manganese ore, mica and phosphates required prompt consideration in order "(a) to identify the problems faced by the commodity; (b) to determine the techniques appropriate for dealing with them; and (c) to agree on appropriate remedial measures".

93. At the secretariat level, the work of UNCTAD relating to minerals and metals currently comprises: (a) an annual review of the international commodity situation in selected minerals and metals (published in the annual Commodity Survey); (b) special studies pursuant to resolution 16 (II), referred to above; (c) studies of the economic implications for the economies of the developing countries of the production of minerals from the area of the sea-bed beyond the limits of national jurisdiction and of possible solutions for dealing with resultant problems; (d) the provision of appropriate documentation and services to intergovernmental commodity consultations and conferences (for example, the United Nations Conference on Tin, held in April-May 1970, to renew the International Tin Agreement of 1965, and the intergovernmental consultations on iron ore, manganese ore and phosphates held in January-February 1972) including the regular provision of services for the UNCTAD Committee on Tungsten; (e) the econometric analysis of the working of the world markets for certain of the principal minerals and metals, including projections of probable future supply and demand trends.

94. The current work programme of the Commodities Division of the UNCTAD secretariat includes a number of activities that are closely related to the development of mineral resources, as described below (see also TD/B/407/Add.1).

95. The world markets for iron ore, manganese ore and phosphates are under continuous review in order to identify problems and propose appropriate remedial measures for consideration by Governments in accordance with UNCTAD resolution 16 (II). The Conference secretariat assists in providing services for intergovernmental consultations on minerals convened in this regard.

96. Tungsten is under continuing attention in accordance with the work programme of the Committee on Tungsten. The provision of secretariat services for the Committee on Tungsten and its subsidiary bodies (the Working Group on Tungsten and the Statistical Working Party on Tungsten) includes the preparation of market reviews and other studies, a quarterly bulletin of statistics and a periodic bibliography.

97. Reviews of trends in trade in minerals and metals, with special reference to those not covered by other international bodies, are prepared as a contribution to the annual Commodity Survey and for other secretariat reports on commodity trends. The analysis of general problems in international trade in the minerals and metals sector as a whole - with particular reference to the role of the developing countries - is designed to provide a framework for the detailed examination of individual mineral commodities. In addition, UNCTAD follows important developments in such minerals as copper, tin and lead and zinc.

Quantitative analysis of particular problems of commodity policy

98. Econometric studies of commodity markets, including those for selected minerals and metals, are undertaken to furnish the quantitative data needed for identifying and analysing commodity problems and to provide the basis for recommendations regarding the kind and extent of policies necessary to deal with these problems.

8. United Nations Industrial Development Organization (UNIDO)

99. The United Nations Industrial Development Organization (UNIDO) was established as an autonomous organization within the United Nations by the General Assembly in its resolution 2152 (XXI) in order to promote and accelerate the industrialization of the developing countries, with particular emphasis on the manufacturing sector. In paragraph 2 (a) (viii) of the above-mentioned resolution the activities to be undertaken by UNIDO in the utilization of natural resources for industrial development are set out as follows:

> "Offering advice and guidance, in close co-operation with the appropriate bodies of the United Nations, the specialized agencies and the International Atomic Energy Agency, on problems relating to the exploitation and efficient use of natural resources, industrial raw materials, by-products and new products of developing countries, with a view to increasing their industrial productivity and contributing to the diversification of their economies".

100. The Organization has developed a substantial programme of work in the conservation and utilization of natural resources for industrial development based on the above-mentioned basic resolution, as well as on the directives and recommendations made by the Industrial Development Board. Its work has been further reinforced by the Special International Conference of UNIDO held at Vienna in June 1971, as indicated in its consensus resolution (A/8341/Rev.1, chap. 2).

101. In carrying out its work programme, UNIDO undertakes two basic types of activities: operational activities - the implementation of technical assistance requests from the developing countries; and related supporting activities - action-oriented studies and research designed to increase the effectiveness of its operational activities. These activities are examined and approved each year by the Industrial Development Board.

102. The work carried out by UNIDO in natural resources and other fields in order to promote industrial development is described in the programme documents prepared every year for the consideration of the Industrial Development Board. The work programme of UNIDO for 1973 is contained in document IDB/97, parts 2 and 3. This programme for 1973, as well as the updating of the programme of work for 1972, was approved by the Industrial Development Board at its sixth session held at Vienna from 23 May to 2 June 1972.

103. The activities of the organization that relate to natural resources are described below under the following functional headings: (a) metallurgical industries; (b) construction and building materials industries; (c) chemicals, pharmaceuticals and pulp and paper industries; (d) fertilizers, pesticides and petrochemicals industries.

Metallurgical industries

104. In the complex of activities involved in the economic exploitation of ore bodies, UNIDO is primarily involved in metallurgical operations, which cover the winning of metals from their ores, their refining and their further processing by such operations as rolling, forging and casting.

105. A number of technical assistance projects based on the utilization of mineral resources are being implemented by UNIDO at the request of the Governments concerned. The following projects are examples of UNIDO's activities utilizing mineral and energy resources in the metallurgical industry (IDB/80/Add.2, pp. 31-35 and IDB/97, part II, pp. 39-40):

"(a) Direct reduction of iron ores - these projects involve the study of iron ores for the production of sponge iron through the use of natural gas and auxiliary utilization of electric power;

(b) Feasibility studies for the production of ferro-alloys and special alloy steels. These studies involve the production of ferro-alloys through electro-smelting of their respective ores, utilizing large quantities of electricity;

(c) Production of ferro-vanadium from vanadiferous magnetite. This project is based on the use of local ores and electric power for electrosmelting of vanadium-rich slag and pig iron, followed by the production of vanadium oxide for final processing into ferro-vanadium;

(d) Electrosmelting of ilmenite concentrates obtained from the treatment of heavy beach sands. These projects are concerned with the production of titanium dioxide pigments and pig iron and they are dependent on the availability of large quantities of electric power for electro-smelting;

(e) Assistance in the utilization of pyrrhotine ashes. This project is concerned with the recovery of copper and iron oxide from pyrrhotine ashes. It is based on the utilization of local ores and electric power to recover these oxides which are then pelletized into high-grade ore used in iron smelting;

(f) Mineral and metallurgical research centre. This project relates to the extraction of copper from complex ores and the recovery of valuable by-products;

(g) Assistance in the installation of an aluminium smelter in an integrated aluminium plant. This plant will employ electrolytic production of aluminium using electric power for the electrolysis of aluminium and utilizing water as an ancillary".

106. A number of supporting activities, directly related to the utilization of mineral resources to produce ferrous and non-ferrous metals, have been carried out, for example (IDB/97, part II, pp. 41/42; IDB/64, Add.2; IDB/80 Add.1, pp. 37/38):

"(a) Studies on alumina and aluminium production;

(b) Expert group meeting on modernization and expansion of plants in the copper industry;

(c) Expert group meeting on lead and zinc production;

(d) Seminar on copper production and a group study tour of copper plants in the USSR; and

(e) Interregional symposia on the techno-economic aspects of the development of the iron and steel industry."

Construction and building materials industries

107. The majority of the raw materials used in the construction and building materials industry are mineral resources of a non-metallic nature - refractory materials, ceramic materials, asbestos, marble, limestone, shale, gypsum and so forth. The investigation of mineral resources is carried out by UNIDO in a pragmatic way in those industries where there is a direct link to a specific industry which is under establishment or under active consideration.

108. The Organization's technical assistance projects in this industry utilizing local natural resources range from advice in the determination of demand, the initiation of feasibility studies, the selection of raw materials and production methods, to assistance in the erection and operation of new facilities and the improvement and operation of existing facilities.

109. The following projects are examples of UNIDO's operational activities which utilize natural resources in these industries (IDB/80/Add.1, pp. 47-48; IDB/97, part II, pp. 49-50; IDB/97, part III, list 1):

"(a) Feasibility study for establishing a domestic cement plant utilizing local raw materials;

(b) Assistance to a developing country in the expansion of the domestic cement industry, including the planning of new facilities;

(c) Expert assistance in the ceramic industry at an established brick plant where technical difficulties have restricted production;

(d) Assistance and advice on a long-range programme for establishing a new industry in a developing country which has abundant resources of various ceramic raw materials;

(e) Development of projects which include demonstration production facilities."

110. The following are examples of supporting activities in the natural resources field carried out by this group (IDB/97, part II, pp. 51, 53· IDB/64/Add.3· IDB/80/Add.1, pp. 51-53):

"(a) Study on 'the manufacture of cement and sulphuric acid from calcium sulphate' which will provide the developing countries with information on the simultaneous manufacture of cement and sulphuric acid;

(b) Expert group meeting on fibro-cement composites·

(c) A series of regional workshops on the clay building materials industry·

(d) Studies in the building materials industry relevant to the needs of the developing countries, including studies on:

(i) Manufacture and use of special glasses, glass products and refractories;

(ii) Survey of techno-economic project data on basic materials;

(iii) Manufacture of large wall panels from cement and other composites."

Chemicals, pharmaceuticals and pulp and paper industries

111. Natural resources provide many of the raw materials, energy, water and water transportation necessary to the development of these industries. The programme of assistance of UNIDO within these industries is designed to promote the utilization and processing of locally available resources and to stimulate the development of the primary industries within this group. The cost of the transportation of basic chemicals from the present sources of supply in the developed countries has restricted the introduction and growth of user industries in the developing countries.

112. In the development of the chemical industry, UNIDO is placing emphasis on (a) the production of marine and mineral salts through the use of solar energy· (b) the production of essential oils from botanicals with a view to their utilization in the manufacture of pharmaceuticals and toiletries, as well as auxiliary chemicals. The assistance given takes a number of forms, from diagnostic assessment missions to comprehensive technical and economic pre-investment studies. The following projects are examples of UNIDO's operational activities which utilize natural resources in these industries (IDB/80/Add.1, pp. 59-62· IDB/97, part II, pp. 62-63, and part III, list 1):

"(a) Execution of a project on methods of extracting and processing chemicals from rock salt;

(b) Examination of the feasibility of extracting chemicals and establishing a chemical industry based on raw materials from lake brines and dry lake beds;

(c) A study on the extraction of salt from mining wastes which contain ores of potassium and sodium chlorides."

113. In addition to the direct technical assistance activities, UNIDO also carries out within this group a number of supporting activities which have a bearing on natural resource utilization such as the following (IDB/80/Add.1, pp. 62-66):

"(a) Compilation of a bibliography on the hydrogenation of coal and coal tars; and the preparation of a report on the carbonization of coal, the recovery of by-products, and the hydrogenation of coal;

(b) An expert group meeting on the modernization and mechanization of salt industries based on sea-water;

(c) An expert group meeting on the establishment of pharmaceutical industries in the developing countries;

(d) An expert group meeting on the pulp and paper industry to develop guidelines for further technical assistance in this field."

Fertilizers, pesticides and petrochemicals industries

114. The development of the fertilizer and petrochemical industries is normally dependent on the availability of the natural resources which provide their raw material inputs. Besides hydrocarbons, these industries also have heavy requirements in terms of water and energy resources. United Nations Industrial Development Organization gives advice and assistance in the utilization of crude oil (including refining), natural gas, phosphate rock, sulphur, potash and the like, for fertilizer and petrochemical production.

115. As part of the operational activities of this group, UNIDO provides assistance in the identification of investment opportunities and the preparation of market, technical and feasibility studies and specific techno-economic feasibility studies. The following examples indicate the range of technical assistance in this group which has a bearing on the utilization of natural resources (IDB/97, part II, pp. 73-74 and part III, list 1):

"(a) Industrial and marketing survey on petroleum derivatives and natural gas;

(b) Desulphurization of petroleum and sulphur recovery;

(c) Pre-investment survey for the petrochemical industry;

(d) Assistance in the utilization of natural gas for petrochemical industries;

(e) Natural gas development - petrochemicals and fertilizers;

(f) Performance, evaluation and utilization of petroleum products;

(g) Assistance in development of the phosphate industry."

116. The following are examples of supporting activities carried out in this group which have a bearing on natural resources utilization (IDB/80/Add.1, p. 81; IDB/97, part II, pp. 76, 80):

"(a) Second Inter-regional Petrochemical Symposium, where the utilization of crude oil, naphtha, natural gas and associated gas was specifically discussed;

(b) Second Inter-regional Fertilizer Symposium discussed the utilization of coal, natural gas, associated gas, crude oil and naphtha for synthetic nitrogen production;

(c) Proteins from hydrocarbons."

117. The activities discussed above are those most directly dependent upon natural resources for raw materials, energy, water and so on. In its other functional groups, UNIDO also undertakes activities which bear a close relationship to natural resources development. Among these groups are the engineering industries, light industries, small-scale industries and industrial estates, industrial programming and project planning, the promotion of export-oriented industries, and environmental planning, management and control. Within these functional groups, UNIDO also provides assistance to the developing countries in (a) the optimum utilization of local natural resources, giving due consideration to the appropriate technology for local conditions; (b) product development and adaptations for local manufacture; (c) the effective utilization of existing manufacturing capacities; (d) environmental considerations associated with the development of industries which utilize natural resources.

B. THE INTERNATIONAL LABOUR ORGANISATION (ILO)

118. The development of natural resources, particularly minerals, energy and water, can be hindered by inadequate management and the absence of trained manpower at several points of the development cycle: exploration and discovery, analysis of volume and quality, extraction, determination of appropriate technology for processing, market and export analysis, development of associated infrastructure, distribution and transport.

119. The training of competent management personnel, technicians and skilled workers is one of the basic conditions of the effective development of natural resources in each step of the cycle. In the field of management, some of the newer methods and techniques, such as computer-based operations and research models, are of great interest to enterprises and organizations engaged in the development of natural resources. On this basis, the ILO's management development programme provides assistance, oriented mainly towards technical co-operation, in training, advising and assisting managers for the more effective exercise of their role through the enterprises, large and small, which they manage in the public and private economic sectors of the nation and through the administrative organizations they control in the public sector (ILO Programme and Budget 1972-1973, paragraph 361). This includes the training of managers and assistance in the solution of practical management problems for enterprises and organizations engaged in development activities connected with natural resources, such as exploration and discovery, mining, oil extraction, water-supply, electricity, gas and others.

120. In the specific field of vocational training, the ILO's mandate is to promote and assist in the training of manpower in all age groups, in every field of economic activity and at all levels from semi-skilled workers up to and including technicians. Emphasis in the work of the ILO in this field is on the planned expansion and improvement of vocational training and assistance, particularly in relation to training for employment. The scope of the ILO's activities includes the direct training of personnel by ILO organs such as the International Centre for Advanced Technical and Vocational Training at Turin, Italy, and the Inter-American Research and Documentation Centre for Vocational Training (CINTERFOR) at Montevideo, Uruguay.

121. To support these technical activities and to develop improved standards and practices, the ILO undertakes studies and research and compiles and disseminates information. It also establishes international standards in the field of vocational training which provide guidance to countries in making policy decisions and act as a foundation for planned development and improved organization and legislation for training.

122. In general, it can be said that most ILO activities in the field of vocational training can indirectly serve human resources development in relation to the exploitation of natural resources. Specific programmes and activities to be undertaken by the ILO that are relevant to natural resources development are described below.

123. The management development programme will continue to cover consultancy and management training for natural resources development, including the management training of engineers and technicians selected for management posts. Special studies will be carried out regarding management development needs in the various sectors, including that of the extractive industries, and the best ways of meeting those needs. The management development programme will also embrace study, development work and field assistance in the management of complex development projects, with special emphasis on their human resources aspects.

124. Projects of this type, involving some direct assistance in the development of natural resources, are already in operation in Cyprus, Iran, Iraq, Jamaica, Mali, Syria, Turkey, Trinidad and Tobago, Uruguay and other countries. For example, assistance in various aspects of management was provided to the coal mines in Turkey, to the organizations and authorities producing and distributing electricity in Iran and Syria, to the geological survey institute in Iran and to the petroleum authorities and companies in Syria and Trinidad and Tobago. In Jamaica, Uruguay and many other countries, assistance was given to enterprises producing building materials from local natural resources.

125. Many vocational training projects to be run in 1973/74 have as their aim the over-all planning and organization of vocational training systems at the national level and the training of instructors, technicians, supervisors, skilled and semi-skilled workers for industry. Such projects will operate in Chile, Colombia, Ethiopia, Ghana, Kuwait, Libya, Malaysia, Peru, Republic of Korea, Sri Lanka, Sudan, Thailand and Tunisia among other countries. It is expected that industries dealing with the exploitation of natural resources will derive a direct benefit from the above activities.

126. Some specific examples may be given here of vocational training projects that will provide direct assistance to the devleopment of natural resources. A technical assistance project will start operations in Peru during the second half of 1972 to establish a vocational training centre in Recuay for the mining industry of Ancash. The long-term objective is to assist the Government through its Ministry of Power and Mining in the training of the necessary manpower to meet the objectives and priorities for the mining sector established in the regional development plan for the northern region of the country. The centre of Recuay will be the starting point of a network of vocational training centres for other mining regions. The immediate objectives of the project are to contribute to the study of the present situation in the small and middle-scale mines of Ancash, to advise on the planning, programming and execution of vocational training activities, to advise on the equipment of the centre, to train the teaching staff, to participate in the establishment of a system of selection of students, to assist in running training courses in the centre and in the mines with the help of mobile units and to advise the vocational training service of the Ministry on the recruitment and training of teaching staff for other centres. During the three-year period of the project, a minimum of 126 new skilled workers will be trained; 540 workers will participate in further training activities and 80 supervisors and 120 managers of small-scale mines will be trained. The UNDP contribution will be $474,750 and the contribution of the Government $282,000.

127. The possibility of establishing a technical assistance project for vocational training in the mining industry in Bolivia is under discussion. In the region of Potosí-Oruro, a large number of small-scale miners work at a very low level of productivity. Although frequently the small-scale miners control very important mining concessions, they do not achieve a rational exploitation of these resources.

128. Some large ILO projects have rather important components that, in the field of vocational training, are intended to assist industries in charge of the exploitation of natural resources. Within the framework of country programming for Tunisia, for instance, technical co-operation is proposed with a view to improving the adaptation of vocational training to the real needs of industry. This will be achieved by adopting a sectoral approach to training and by increasing enterprise participation in training. As the national development plan gives priority, among other sectors, to the mining industry, special emphasis will be placed on this industry within the vocational training project.

129. In Colombia, the National Apprenticeship Service (Servicio Nacional de Aprendizaje - SENA) will, with the help of the ILO (1972-1974), provide assistance to enterprises with a view to establishing vocational training services to solve the training problems of their personnel. Within this project, a training centre has been established for the petrol industries of Barrancabermeja with the intention of training skilled workers and of giving assistance to enterprises in the establishment of their own vocational training services. A similar centre has also been established for the coal and steel industry of Paz de Rio.

130. The National Institute for Vocational Training (Instituto Nacional de Capacitación - INACAP) in Chile is running a programme, with the assistance of the ILO (1969-1974), to create vocational training services in enterprises where they are lacking and to improve those already in existence. The levels of skill considered in this project range from the semi-skilled worker to the technician. A particular emphasis is being put on middle-level technicians. Among other enterprises, assistance is given to mines extracting coal, copper, iron and nitrate as well as to the petrol industries.

C. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO) 9/

1. Constitutional mandate

131. The functions of the Food and Agriculture Organization of the United Nations, as defined by article I of its Constitution, are to collect, analyse, interpret and disseminate information relating to nutrition, food and agriculture (including forestry and fisheries). Furthermore, article I directs that FAO shall promote and recommend national and international action with respect to, inter alia, scientific, technological, social and economic research relating to agriculture; the improvement of education and administration and the spread of public knowledge of agricultural science and practice; the conservation of natural resources and the adoption of improved methods of agricultural production. Finally, the Organization is instructed to furnish such technical assistance as Governments of member States may request.

2. The work of FAO as related to natural resources development

132. Agriculture and the related activities of forestry and fisheries make up the largest industry on earth. More than half the people in the world are directly engaged in working farmlands and forests, lakes, rivers and seas.

133. Agriculture, forestry and fisheries are based on the development and utilization of natural resources. In this sense, water, soil, air and solar energy are basic natural resources for agriculture, but genetic resources, either in the form of natural plant and forest cover, wild life and natural fish resources, or in the form of genetic potential for controlled breeding, are also basic natural resources for agriculture and its related activities. In some instances, production is simply a harvesting of natural resources. In other instances, production is a rather complex process of controlling, manipulating and combining the different natural resources such as water, minerals and seeds. Production also takes advantage of natural resources, such as solar energy, soil and climate. Practically all activities of FAO in the field of agriculture, forestry and fisheries are basically concerned with the development, utilization and conservation of natural resources.

3. The responsibilities of FAO in the field of water resources

134. It should be emphasized that among the basic natural resources, water is of paramount importance in rural development, and the effective use of water resources in agriculture must be related to the use of other basic natural resources. For the purpose of this report, an attempt has been made to limit the description of the competence and the activities of FAO to what concerns water, but its interrelation with other resources has to be kept in mind for the understanding of the complex resources utilization system on which agriculture is based.

9/ The figures given in this chapter are taken from The Director General's Programme of Work and Budget for 1972-1973 (FAO, Rome, C/71/3 March 1971), unless otherwise indicated.

135. The interest and competence of the Organization in water resources derive from the responsibilities placed on it by its Constitution. This mandate has been elaborated upon and given precision by various directives concerning water resources, given to the FAO secretariat by the Conference of the Food and Agriculture Organization at various sessions. These directives, apart from those that relate to fisheries, concern the integration of two basic natural resources, soil and water, and their management in a technically and economically efficient system of production. They include the appraisal of water resources; the combined investigation and use of surface water and groundwater resources; the co-ordination of work for the development of land and water resources and for the management of large watersheds and river basins, flood control and water conservation; the conservation of the natural resources of water along with those of soil, forests and fisheries, and the preparation of an inventory of water resources: the improvement of the efficiency of water utilization, the use of brackish water and sewage water and the prevention of salinity, international water legislation and administration; the control of marine and inland pollution for fisheries; the rational use of natural resources and the prevention of over-exploitation, erosion and pollution.

136. Apart from indicating the field of priorities from time to time, the FAO Conference has emphasized an integrated approach to the problems of water resources, their development and utilization.

137. The need for co-operation with other international agencies with regard to water problems was emphasized by the Conference. It was observed that with a clear differentiation of functions, greater understanding and, therefore, closer co-operation were facilitated and concrete results became available to member countries through joint endeavour.

4. The approach of FAO to water resources development

138. In general, water is considered a unity, both in its nature and in its development. Thus, the hydrological cycle forms a unifying concept for water as a natural phenomenon, and the task of water-use planning is to modify the concept of water as a natural phenomenon to that of water under control for man's different needs. In particular, the dominating influence of agriculture and forestry, not only on the hydrological cycle but also as the major water-using activities, require the harmonization of water resources, their development and use with:

(a) The development and use of other natural resources that are essential for rural development (soil, grassland, plants, forests, fish resources);

(b) The environmental impact of agriculture and forestry, as evidenced specifically in erosion, sedimentation, salinity, waterlogging, pollution, but also in its positive aspects such as the cultivation of waste land, the improvement of the rural environment and the creation of green belts around population centres;

(c) The conservation of natural resources and the requirements of their rational use;

(d) The use of agricultural inputs (fertilizers, seeds, pesticides, farm machinery) for optimum production;

(e) Complementary water uses for large-scale development of predominantly rural areas (infrastructure, water supplies etc.);

(f) The requirements of the social and economic development of rural areas (education, management, institutions);

(g) The betterment of rural life;

(h) The contribution that agriculture and forestry can make towards waste water disposal.

5. The capacity of FAO in multidisciplinary work

139. The broad approach to water problems, as outlined above, requires truly interdisciplinary work for which FAO has the technical expertise. The focal point for the work on water resources is in the Land and Water Development Division, which also provides the expertise on soil resources as they are related to water. Furthermore, FAO has available knowledge in the related fields of forest influence, management of watersheds, agro-climatology, influence of plant cover, management of water resources including man-made lakes for fisheries, water quality and pollution as related to agriculture, fertilizer use and fisheries. FAO has special expertise on water administration and legislation. Its Economic and Social Department provides the links to the more general aspects of rural development and the improvement of the living conditions of the rural population. In addition, FAO has permanent working relations with UNESCO, in the field of scientific hydrology (International Hydrological Decade) and research on soil resources, salinity and waterlogging; with WMO, in the field of hydrology, climatology and agro-climatology; with WHO, for sanitary engineering, water quality requirements and waterborne diseases; with IAEA, for the application of nuclear techniques in hydrology, hydrogeology and, through a joint division, for the investigation of water movement in the soil; with IBRD, through a joint division, for investments in water development; and with the regional economic commissions, through joint divisions, for general aspects of social and economic development.

6. Description of the activities of FAO

140. Technical and financial assistance with agricultural development in member States is predominant in the work of FAO. Much of the activity of FAO with regard to water consists of field projects (operational activities). The regular programme (non-operational activities) and the field programmes are considered complementary. The work of FAO in the field of water is carried out through the following programmes.

(a) Regular programme

141. Under its regular programme, FAO works on general surveys and programmes of systematic collection and processing of information, research and studies, publications, conferences and working parties, seminars and training courses, and the provision of technical services for field programmes, this last constituting about 35 per cent of the regular programme activities relating to water.

142. The regular programme concerning water is carried out by the technical divisions at FAO headquarters, the principal responsibilities lying with the Land and Water Development Division, and the water development officers of the FAO regional offices. Under this programme, 24 officers cover all the required specializations of water disciplines.

(b) UNDP/FAO field programmes

143. Agriculture, because of its importance to sound economic development and because of the frequently large numbers of underprivileged persons involved, has always received the highest attention from UNDP. Consequently, UNDP projects on the development of natural resources for agriculture, executed by FAO, rank highest among all UNDP activities in this field. According to the report of the Administrator of UNDP to the Committee on Natural Resources at its second session (E/C.7/22, tables 1 and 2) 60 per cent of all natural resources projects and 63 per cent of all land and water development projects have been carried out by FAO. In 1971, FAO had 87 water development projects under execution. In addition, 34 projects on agriculture had a major water component and FAO was also associated with 22 water projects, which it did not actually operate.

144. UNDP/FAO water projects can be classified under the general heading of projects to meet pre-investment needs and concern applied research, hydrological and hydrogeological surveys, development planning, the preparation of feasibility studies, the construction and operation of pilot schemes and the training of technical personnel and project cadres.

145. The technical and operational supervision of FAO water projects in the field is carried out by 14 specialists of the Operations Service of the Land and Water Development Division at FAO headquarters. Three hundred and thirty-six field experts have been recruited to work under this programme. In addition, about 30 per cent of the projects are subcontracted.

(c) FAO Investment Centre

146. In order to help to break down the barriers between pre-investment surveys and development, FAO has created an Investment Centre which has played a growing role in recent years in finding finance for investment in agriculture. The Investment Centre is helping IBRD, through its FAO/IBRD Co-operative Programme, to identify and develop investment possibilities for bank financing. The Food and Agriculture Organization co-operates with the regional banks and private banks for the same purpose.

147. In the field of water resources development, irrigation and drainage, the FAO/IBRD Co-operative Programme has assisted and evaluated 24 irrigation, drainage, water development and reclamation projects that led to the approval of loans by the World Bank Group of $488.8 million. The total cost of these projects is more than $1,100 million. In addition, the FAO/IBRD Co-operative Programme advises those involved in the pre-investment projects of the FAO field programme on the requirements for the preparation of bankable projects. The guidelines on the preparation of feasibility studies for irrigation projects issued by the FAO Investment Centre are part of this flow of information between FAO as the major agency for field project execution and the bank.

(d) Funds-in-trust

148. The work under funds-in-trust arrangements complements the regular programme and the field programmes, especially in regard to training and the transfer of technology. However, in recent years, a change of emphasis towards actual development work has been observed in requests for assistance under funds-in-trust arrangements; projects of the Freedom from Hunger Campaign give direct technical support to the execution of development projects and Governments in an increasing number of cases have asked FAO for advice and assistance in project implementation through funds-in-trust arrangements.

149. Typical funds-in-trust projects have concerned, for example, groundwater development in Saudi Arabia and river basin development in Lebanon. At present, 111 experts in land and water development work under this programme.

(e) World Food Programme

150. Jointly operated by United Nations and FAO, the World Food Programme uses food aid in the implementation of development projects. Thirty-four water development projects concerned with irrigation, drainage and land reclamation have received such support which has, in some cases, been impressive as, for example, in the land reclamation works in Egypt for which about $30 million worth of food aid have been earmarked so far. The technical services of FAO assist the WFP in the technical evaluation of development projects.

7. Outline of FAO's programme of work 10/

151. FAO's programme of work is organized according to the programme budgeting system. Technical subjects of the regular programme and the field programmes are integrated under main "areas of emphasis" with defined programme objectives. Subprogrammes under the main areas list the individual work units referring to the technical units concerned and show also their interrelation with the work of other units.

10/ See The Director General's Programme of Work and Budget for 1972-1973 (FAO, Rome, C 71/3, March 1971), as approved by the FAO Conference. Titles of programmes and subprogrammes in this report already reflect the revised programme structure as of August 1972.

152. Water subprogrammes can be found under the following main areas of emphasis:

(a) Mobilization of human resources;

(b) Production and productivity;

(c) Conservation of resources;

(d) Agricultural policy and planning.

153. The following summarizes the objectives of subprogrammes and programme elements of the biennial 1972-1973 and medium-term 1972-1977 programmes.

(a) Organization and management of land and water development schemes

154. The benefits from investments in water development schemes for agriculture depend on the effectiveness with which such schemes are operated. In Asia alone, 50 per cent of all investments in agriculture will have to be made for irrigation, drainage and flood protection. The objective of this subprogramme is to promote better use and long-range security of investments in water development by providing assistance for the organization and operation of irrigation and drainage schemes, the establishment of appropriate water administrations and water users' organizations and the formulation of effective water management policies and laws.

155. The work under this subprogramme includes establishing and strengthening institutions and organizations for the survey and evaluation of land and water resources, testing - through pilot projects - the acceptability and adaptability of advanced water management techniques under local conditions and studying the relation between the introduction of advanced water technologies and required changes in traditional institutions and organizations.

156. Besides technical and practical assistance for the maintenance and improvement of traditional irrigation within the social-environmental context of rural communities, the work under this subprogramme is concerned with the close interrelationship between rights of land and water use and their importance for the modernization of water administration and institutions.

157. Modern water law and administration is not an end in itself but a tool to carry out specific functions determined by overriding national priorities, such as agricultural development or environmental conservation, rather than by separate single-resource policies. Hence, the vital advisory role of function-oriented agencies and institutions in formulating integrated legal and administrative policies at the international and river-basin level where agricultural water use prevails. Co-operation with the United Nations and other organizations has been established in this field.

158. It has been the constant practice of FAO to provide technical assistance in water law and administration (through its Legislation Branch, staffed by nine professional legal officers) as an integral part of national legislation for agricultural development and environmental quality improvement. Surveys of national water legislation are a continuing part of this function. In addition to the regular collation, translation and dissemination of recent national laws in the Food and Agricultural Legislation series, a previous FAO publication on water laws in moslem countries is at present being revised and brought up to date.

159. Related subprogrammes concerning similar work which have a direct influence on water resources development include: institutions and legislation for soil conservation; institutions and legislation for forest conservation and forest management; fisheries institutions and services; and the organization of agricultural and rural ministries, administrations and related institutions.

(b) Research and training for utilization of land and water resources

160. The rapid sophistication of agricultural methods calls for a corresponding advance in technology and the knowledge of water use and management. The objective of this subprogramme, therefore, is to promote research and training with regard to water by the identification of research needs, the co-ordination of research activities and the incorporation of field requirements in research programmes, and assistance for the provision of training facilities and programmes at all levels.

161. For the identification of research needs in the field of water management and water use, FAO co-operates with the Consultative Group on Agricultural Research (with members drawn from IBRD, UNDP, FAO, research foundations and Governments) and its Technical Advisory Committee which gives high priority to this subject. The subprogramme also provides for contacts with research institutes, universities, scientific organizations and other United Nations agencies for the identification of research needs from the experience of the numerous FAO water projects in the world. Particular attention is paid to the application of the results of basic research through different applied research projects such as the Near East Applied Research Programme, which concerns water application and management, through pilot projects on irrigation and drainage, an ad hoc expert group on water requirements, and studies of the applicability of remote sensing techniques in soil and water resources surveys. A publication entitled Applied Irrigation Research and Guidelines for Determination of Water Requirements and for Hydrological Surveys will help to transmit research experience to the field.

162. With regard to the training of water specialists and technicians, in-service training and fellowships are being organized in the framework of field programmes. Under this subprogramme, several seminars for senior government staff and experts at the regional and national level are being organized on salinity, water management, groundwater development and water resources planning, in close co-operation with and with financial support from Governments and national aid organizations.

163. This subprogramme is related to a number of others dealing with research and training that have a bearing on water problems, such as the subprogrammes for agricultural extension services (irrigation extension); forestry education (watershed management); and general agricultural research facilities and services.

(c) Surveys and planning of soil and water resources

164. Data collection for water development projects for agriculture is a cybernetic process involving water resources surveys, soil surveys, topography, agricultural surveys, surveys on infrastructure and other aspects. Because of the cost, accuracy and time required, water resources surveys are the determining factors in this process. The objective of this subprogramme is to extend knowledge and promote increased efficiency in water resources surveys and water planning for agricultural water development projects.

165. The subprogramme provides for specific assistance and advice on surveying water resources, with increasing emphasis on integrated surface water and groundwater studies, on appraisal methods directed towards the conjunctive use and re-use of water, and the necessary integration with soil resources surveys and appraisal.

166. The work under this subprogramme includes the revision and updating of computer simulation programmes in hydrology and hydrogeology, studies in co-operation with WMO and UNESCO, for routine hydrological data collection, processing and retrieval, the provision of services to the International Hydrological Decade Working Group on the Hydrology of Carbonate Rocks in the Mediterranean Basin, co-operation with the WMO Working Group on Hydrological Design Data for Water Resources Projects with view to providing experience from FAO field projects, a study on the use of computers and models for planning water use in agriculture, a publication on groundwater for agriculture and direct assistance to Governments in planning water development and water use at the national, river-basin and project level.

167. This subprogramme is related to subprogrammes dealing with surveys of other resources, such as those on forest resources and forest hydrology; plant ecology surveys; general agricultural surveys, and the WHO/UNDP/UNESCO Inter-Agency Co-ordinating Group in Agricultural Bioclimatology.

(d) Assessment of land and water resources and needs

168. It has been estimated that between 70 and 80 per cent of the water developed by man is consumed in agriculture. National agricultural development planning and perspectives of national, regional and world agricultural development require the assessment of land and water resources and the projection of future needs for the development of such resources. The objective of this subprogramme is to assist member States in planning the development of their land and water resources efficiently and realistically and to provide the basic data on natural resources for FAO's perspective study on world agricultural development.

169. The work under this subprogramme is concerned with the interpretative assessment of soil and water resource data, including the most efficient use of data already available from previous surveys and the transformation of these data into forms directly usable for planning at the national level. The subprogramme is

also concerned with computerized storage and retrieval systems for the inventory and analysis of soil and water resources data, the trends and potential of world irrigation development, and advice and assistance to national planning authorities on relating demands for agricultural production, employment targets and rural development plans to the available water resources, with the aim of formulating integrated land and water policies and plans at the regional, river-basin and national level.

170. This subprogramme is directly related to the main area of emphasis on agricultural development planning and the FAO/UNESCO programme of the soil map of the world.

(e) Land reclamation

171. The development and reclamation of problem soils is affected by and closely related to water and its control; salinity and waterlogging are caused by high groundwater levels, and the reclamation of peat and sulphuric acid soils requires the exact control of water movements. The objective of the land reclamation subprogramme is to provide assistance to Governments of member States in the reclamation of saline, alkaline and waterlogged soils.

172. The work under this subprogramme includes the prognosis of salinity and alkalinity hazards, reclamation measures such as soil drainage, swamp drainage and the control of groundwater levels, the operation of pilot reclamation schemes, publications and seminars on the reclamation of saline soils, drainage techniques, and applied research into water control for the reclamation of problem soils, in co-operation with the FAO Land and Water Use Commission for the Near East Region, the International Commission on Irrigation and Drainage and scientific institutes.

173. This subprogramme is closely related to that concerning water application, management and use (see paragraphs 178-183 below).

(f) Water development

174. For about 50 per cent of the agricultural production in the world, water has to be controlled. Agricultural development of large areas in the world will remain dependent on successful water resources development. The objective of the water development subprogramme is to assist Governments of member States in planning water resources development at the project level and in designing water development schemes.

175. Under this subprogramme advice and assistance are given in water resources development projects for the large-scale agricultural development of international and national river basins, including multi-purpose water development, the conjunctive use of surface and groundwater resources, and the drainage problems of large basins.

176. The subprogramme also provides ad hoc advice to Governments and for field projects on technical and economic aspects of the design and construction of water development works, including water storage, diversion and distribution, flood protection works, drainage systems and polders, and special engineering problems in related fields such as engineering geology, groundwater development, recycling of water, canal lining and mechanized drain construction.

177. A work unit under this subprogramme deals with the particular aspects of labour-intensive construction methods for water development projects.

(g) Water application, management and use

178. Under traditional irrigation practices, water use is usually high, while yields are low. In most developing areas, very little is known about the amount of water to be applied at each irrigation or the frequency of irrigations for optimum crop returns. However, the allocation of scarce water resources and the planning of costly water development projects can no longer be based on tradition and past experience; effective water use in agriculture rather calls for a new approach which seeks to maximize the efficiency of input use by water management, fertilizer application, the use of high-yielding varieties of crops, and land preparation. The objective of the subprogramme is to assist Governments of member States in the promotion of efficient irrigation and drainage methods and techniques and proper water management for the effective utilization of water in agriculture, thus permitting the most efficient use of other agricultural inputs for optimum crop production.

179. The work under this subprogramme concerns study and assistance for the introduction of improved irrigation and drainage methods and techniques, including the specific aspects of rice irrigation, problem soils, and measures to reduce water loss; publications on surface irrigation and water management for rice are in preparation.

180. The subprogramme, through ad hoc expert groups, publications and the elaboration of guidelines, also deals with the determination of water requirements for crops, evapo-transpiration, and field tests for optimum water/yield relation. This work includes the study of methods of predicting the risk of crop failure, due to droughts in semi-arid areas, and the timely and efficient use of supplementary irrigation.

181. Advice and assistance are also given on problems of water quality as they relate to agriculture, for example, on the salt content of irrigation water, the transport of fertilizers and pesticides by water and, with the direct participation of WHO, on health aspects, in particular the danger of spreading water-borne diseases by irrigation and recycling of water.

182. This subprogramme provides services to the Land and Water Use Commission for the Near East, is concerned in the establishment of land and water use commissions in other regions and the preparatory work for the establishment of water management centres for rain-fed and irrigated agriculture and integrated resources planning which were recommended by the United Nations Conference on the Human Environment, and for which co-operation is sought from the Consultative Group on Agriculture Research and other United Nations agencies.

183. The work of this subprogramme is closely related to that of other subprogrammes dealing with soil management, fertility and fertilizer use; high-yielding varieties of seeds and pest control; agricultural machinery and equipment; and the joint FAO/IAEA programme (water movement in soils, evapo-transpiration).

(h) Soil and water conservation

184. All water is a single resource and neither the development of surface water nor that of groundwater can be considered in isolation. The scientific approach to the determination of the water resources of any natural unit is an integrated one in which a water balance is resolved. Agricultural activities, including grassland management, forestry and fisheries, are a dominating factor in this water balance and often decisive for the increase or decrease of the value of the water resource for human communities. The objective of the soil and water conservation subprogramme is to assist Governments of member States in the protection of land and water resources by the assessment of pollution and degradation and the introduction of conservation and rehabilitation measures.

185. The work under this subprogramme includes assistance for a global evaluation and monitoring of the degradation of land and water resources, the establishment of international standards for assessing the degree of degradation hazards related to agricultural development, the assessment of the effects of the intensive use of fertilizers, and systematic audits of water development projects to assess their environmental impact. The two FAO publications on land degradation and water and the environment will be revised.

186. This subprogramme is also concerned with studies of soil and water conservation needs, the selection of priority measures for the conservation of productive lands, advice to Governments of member States on the control of overland flow, gullying, riverbank erosion and sedimentation.

187. The subprogramme advises and assists Governments of member States on protective water management with regard to efficient water storage, both for surface water and groundwater, evaporation control, water pollution control, artificial groundwater recharge, and the prevention of sea-water intrusion.

188. Collaboration is sought with UNESCO, WHO and IAEA on the application of approved soil and water conservation practices under specific land-use conditions as recommended by the United Nations Conference on the Human Environment.

189. This subprogramme is related to and complemented by subprogrammes dealing with the exploration, evaluation and conservation of plant genetic resources; forest and wild-life conservation and protection; the improvement of the aquatic environment and the control of aquatic pollution for fisheries resources, including the programme on man-made lakes.

Budgetary and extra-budgetary resources for the main water subprogrammes
(excluding water elements of complementary subprogrammes)
(In dollars)

Number and title of subprogramme		Regular budgetary resources, 1972-1973	Extra-budgetary resources, 1970/71
2.1.2.5	Organization and management of land and water development schemes	82 253	919 200
2.1.3.4	Education, training, extension and research for utilization of land and water resources	130 053	2 478 650
2.2.1.1	Surveys and planning of soil and water resources	510 372	4 424 850
2.2.1.2	Assessment of land and water resources and needs	143 631	3 429 650
2.2.2.1	Land reclamation	223 030	3 729 800
2.2.2.2	Water development	169 948	9 255 150
2.2.4.2	Water application, management and use	222 529	2 836 000
2.4.1.1	Soil and water conservation	193 913	1 090 900
	Total	1 675 729	28 164 200

Source: The Director General's Programme of Work and Budget for 1972-1973 (FAO, Rome, C 71/3, March 1971).

D. UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO)

1. Constitutional position and history

190. The activities and programmes of UNESCO in the field of natural resources derive from its constitutional commitment to the maintenance, increase and diffusion of knowledge and from its traditional role in the promotion of education and science to achieve the goals of economic and social development. Accordingly it has assumed primary responsibility for the building up of a scientific and technological research and training infrastructure in member States in fields including those related to natural resources. This implies the promotion of international co-operation in scientific and technological research, the development of basic and applied science policies, scientific and technological education and training at all levels including the development of institutions for such education and training, and collection and dissemination of scientific and technical information. The Organization has established a similar approach to those fields of science which are directly related with the study and development of mineral, water and energy resources. Because of the geographical character of most of these fields, where international co-operation is a necessity by nature, the activities of the Organization in such areas as geology, hydrology, geophysics, soil sciences etc., are particularly important and are concentrated in a special department, the Department of Environmental Sciences and Natural Resources Research.

191. Since the Organization's earliest days, the science programmes of UNESCO have been concerned with certain problems relating to the natural environment and natural resources. The Arid Zone Research Programme, developed in the 1950s, has been a major basis for much of the substance of present programmes. These programmes are essentially concerned with the study of the various components of the natural environment which are capable of providing man with resources, and of the interplay of these components, leaving aside the marine sciences, which are subject of activities of the same character but not considered in the context of the present report (marine geology, for instance, is obviously related to mineral resources), the principal activities of UNESCO relating directly to natural resources are concentrated in the following disciplines: geology, geophysics, geochemistry, geomorphology, soil science, surface and subsurface hydrology, plant and animal ecology, engineering sciences (including mining and hydraulic engineering). These activities are always centred around the three main lines of action, regularly confirmed by the successive sessions of the General Conference of UNESCO since 1948:

(a) Advancement, dissemination and exchange of scientific and technological knowledge;

(b) Education and training of specialists;

(c) Creation and strengthening of national or regional research and training institutions.

192. The activities of UNESCO relating to mineral, water and energy resources are carried out by three divisions of the Science Sector of the Organization: the Division of Natural Resources Research, the Office of Hydrology and the Division of Technological Education and Research. In addition, in each of the five regional science offices of UNESCO, one staff member is professionally in charge of programmes dealing with environmental sciences and natural resources research.

193. The expenditures of UNESCO relating to mineral, water and energy resources have amounted to:

$1,811,000 under regular programme in 1970

$2,935,000 under UNDP in 1970

$1,990,000 under regular programme in 1971

$3,871,000 under UNDP in 1971

$2,142,000 under regular programme in 1972

$3,708,000 under UNDP in 1972

2. Mineral resources

General areas of competence and activity

194. The Organization is responsible for the promotion of knowledge and at the same time for the provision of a scientific and institutional foundation for the rational evaluation and use of these resources.

195. In the fields of geology, geomorphology, geophysics and geochemistry it is responsible for the standardization of nomenclature, terminologies and cartographic methods, for the synthesis of present knowledge and subsequently for the preparation and publication of small-scale geological and related maps.

196. It activates research and exchange of scientific information, it promotes international interest and co-operation for the study of fundamental problems, organizes applied research on new methods to accelerate the exploration of mineral resources and on the adaptation of existing methods to the particular requirements of a country or region. It also promotes new techniques of mineral exploitation within institutes for research and training.

197. In the field of education and training UNESCO organizes seminars, training courses and post-graduate courses in all subjects related to mineral resources development. It has primary responsibility for the creation and strengthening of research and training institutes in geology, mining and other related sciences, to fill the manpower needs for the development of minerals in less developed countries. Such institutes find their place within universities or national research organizations, but are preferably linked to the planning and development agencies of the country.

198. As education in the fields of applied geology should prepare specialists for practical life and not for study rooms, training programmes will of necessity show a strong element of field work.

Outline of work programmes

199. Specific programmes in earth sciences are the following:

(a) To collect, exchange and disseminate scientific and technical information on geology, hydrogeology, geochemistry, geophysics, to promote global and regional synthesis of knowledge and to provide a scientific basis for better understanding of mineral and land resources;

(b) To develop and improve training of geologists, particularly those specialized in mineral resources, geochemistry, engineering geology and hydrogeology, including geographers, geomorphologists, erosion specialists, etc.;

(c) To assist member States, through extra-budgetary funds and under the regular budget:

(i) In the development of their national institutions and programmes for applied research and training in all fields of earth science;

(ii) In preparation for applied geological studies covering regions and continents, mainly for the preparation of international geological maps.

200. In addition, UNESCO is preparing for the new activities to be undertaken under a new, long-term international programme beginning in January 1973, the International Geological Correlation Programme (IGCP). This will involve:

(a) Providing the secretariat for the IGCP Board and the scientific committees;

(b) Assisting the Board which supervises the programmes and the scientific committee in evaluating and guiding applied scientific projects;

(c) Assisting Member States in the implementation of international research projects and the promotion of regional and subregional co-operation.

201. The need for this research and training programme arises primarily from the growing demands for minerals, groundwater and energy, including fossil fuels, materials for nuclear power and geothermal power sources.

202. Geological correlation taken in a broad sense should lead to a better knowledge of the formation of the earth's crust and provide important means for locating new resources or expanding those which are already known. It should, at the same time, facilitate better planning of urban and rural development through better understanding of geological, geochemical and geophysical events.

203. The programme will consist essentially of a number of global or regional research projects dealing with such broad subjects as rock stratigraphy and its practical applications, with geological events in time and space and their implications in environmental processes, with distribution and formation of mineral deposits, and with related problems of quantitative methodology and data processing. Most projects will need an interdisciplinary approach, making full use of modern knowledge in the different branches of geology as well as of geophysics and geochemistry. While the programme is to be viewed as a long-term one, a number of projects are expected to yield results within a period of four to eight years.

204. The programme will be operated jointly with the International Union of Geological Sciences (IUGS) and co-operation will be maintained with the United Nations, the International Atomic Energy Agency and the other international scientific organizations concerned.

205. At the same time, activities of UNESCO in geology, geomorphology, geochemistry and geophysics in their relation to the study of mineral resources and to the mitigation of natural hazards will be continued. Most of them can be considered as complementary to, and will benefit from, the IGCP. The present emphasis on the promotion of geological, geochemical, geomorphological and geophysical studies relating to mineral and land resources will be maintained.

206. The preparation and publication of small-scale regional, continental and global earth science maps constitute a fundamental approach to the over-all representation of the natural environment of the earth.

207. A review on modern methods and techniques of geochemical mineral prospecting will be prepared and published and symposia on central problems of geochemistry will be sponsored.

208. Particular emphasis will be placed on training activities in the earth sciences through post-graduate courses, regional seminars and specialized fellowships. Training courses in mineral prospecting in developing countries, geothermal energy, engineering geology and applied micropalaeontology will continue to be organized. Here also, the strengthening of the institutional capacity of member States to meet their needs for survey, research and training in the earth sciences and related studies of natural hazards will be assisted through the regular programme or UNDP.

209. Under the United Nations Development Programme 20 projects in 16 countries are implemented by UNESCO in the fields of geology, geomorphology, geochemistry and geophysics as well as in the study and prevention of natural hazards. The United Nations Development Programme has already approved the continuation in 1973-1974 of seven of them including four large-scale projects.

3. Water resources

General areas of competence and activity

210. The United Nations Educational, Scientific and Cultural Organization devotes particular attention to water resources as a basic component of the human environment. It fosters investigations of the water cycle and its elements with a view to assessing the available water resources and their characteristics. It promotes international co-operation to achieve better knowledge of world and regional water balances, of factors conditioning the hydrological processes and of their interrelation with man's activity, and to facilitate the application of modern technology in water resources investigations. The Organization also promotes research in hydraulics and water engineering.

211. The Organization sponsors training courses in water resources at undergraduate and post-graduate levels. It has primary responsibility for the preparation of recommendations on curricula and syllabi for teaching hydrology and water engineering, and on the development of various educational systems in these subjects.

212. Through the publication of guidance materials synthetizing world experience in various aspects of water resources research and education, of catalogues of research and training activities, of maps and global inventories of water resources, and also through the organization of international symposia on the most actual scientific problems in the field of water resources, UNESCO promotes the exchange of information in this field.

213. UNESCO fosters the creation and strengthening of water resources centres for research and training and provides assistance to developing countries for the preparation of national programmes in water sciences and education and for the development of relevant infrastructure.

Outline of work programmes

214. The major commitment of UNESCO in water resources is the programme of the International Hydrological Decade (1965-1974). This programme launched by the General Conference at its thirteenth session was intended to improve the study of the water cycle at world, regional and national levels and to promote an increasing recognition of the basic value of hydrology for the assessment, utilization and conservation of water resources. One hundred and seven member States have been participating in the International Hydrological Decade programme and have created national committees for this purpose. At the international level, the programme is supervised by a Co-ordinating Council composed of representatives of 30 member States. Several United Nations organizations, and in particular FAO, WHO, WMO, and IAEA, as well as non-governmental organizations, contribute to the programme, by taking charge of some of the International Hydrological Decade projects related to their own field of interest.

215. The International Hydrological Decade will be finalized during the 1973-1974 biennium giving priority to the following subjects for which the Co-ordinating Council has created special working groups: water balances, experimental and representative basins, flood and low flow computations, ground water studies, hydrological aspects of water quality, influence of man on the hydrological cycle, hydrology of carbonate rocks, application of nuclear techniques in hydrology, education and training in hydrology, exchange of hydrological information. Particular attention will be given to the continuing publication of the main scientific and practical results of the Decade.

216. Parallel to the finalization of the International Hydrological Decade, preparatory work will be undertaken in view of the launching, beginning with 1975, of a long-term international hydrological programme. The main objectives of this long-term programme, as submitted to the General Conference at its seventeenth session in 1972, are:

- "to provide a scientific framework for the general development of hydrological activities;

- to further the study of the hydrological cycle and improve the scientific methodology for assessment of the water resources throughout the world, thus contributing to their rational use;

- to evaluate the environmental implications of changes introduced by man's activities in the water cycle;

- to promote the exchange of information on hydrological research and on new developments in hydrology;

- to promote education and training in hydrology;

- to assist Member States in the organization and development of their national hydrologic activities".

217. An international conference will be convened in late 1974 to review the results of the International Hydrological Decade and to outline a detailed plan of the International Hydrological Programme for the period 1975-1980. This Conference will be jointly convened by UNESCO and WMO, in order to ensure the harmonization of future programmes of both organizations in the field of water resources.

218. Two major international symposia will be organized in co-operation with WMO, one in 1973 on the design of water resources projects with inadequate hydrological data, the other in 1974 on historical background and present trends in the development of hydrology. Assistance will be provided for symposia and seminars on river hydraulics, hydrology of lakes, education in the field of water resources and the like, organized by scientific non-governmental organizations.

219. Continuing assistance will be provided to the strengthening of co-operation among countries sharing common basins or situated in regions with similar hydrological problems. A meeting on hydrological problems in Europe will be convened in 1973, in co-operation with WMO. Two subregional meetings of national hydrological committees will be organized during 1973-1974 in Africa and Asia. The preparation and publication of sheets for the hydrogeological map of Europe will be continued. Plans will be developed for the preparation of hydrogeological maps of North Africa and South America.

220. Emphasis will continue to be placed on the training of specialized manpower for the developing countries. UNESCO will maintain its sponsorship of 10 international post-graduate courses covering various fields of water resources, such as general and applied hydrology, exploration and development of groundwater resources, hydrological aspects of water management, utilization of nuclear techniques in hydrology and snow and ice investigations. About 350 specialists from developing countries are expected to follow these courses during the 1973-1974 biennium.

221. Assistance from the regular programme and from extra-budgetary resources will be provided to developing countries for the assessment of their water resources; for the preparation and execution of national programmes in water resources research and training, including the relevant infrastructure; for investigations and remedial action in connexion with natural water calamities; etc. At least five large-scale UNDP projects in the field of water resources will be continued in 1973-1974.

4. Energy resources

General area of competence and activities

222. The United Nations Educational, Scientific, and Cultural Organization is responsible for the advancement and synthesis of knowledge in the engineering and research aspects of energy as well as promotion of education and training at technicians' and engineers' levels. In addition, it organizes international conferences and post-graduate courses and promotes research and development in new sources of energy such as solar and geothermal energy. With UNDP assistance, UNESCO is assisting member States in the execution of institutional projects for creation or strengthening of engineering schools and technical universities where engineers are trained in energy development.

Outline of work programme

223. Current programme deals with survey of recent research results in fields such as heat and mass transfer, solar and geothermal energy, quality control and scienc of material; publishes and disseminates results to member States. Seminars and international scientific conferences in solar energy and its applications (the sun in the service of mankind) are under preparation for next programmes to be approve for 1973-1974. Study grants for post-doctoral research will be granted as well as assistance to international centres for research and training in solar energy and heat and mass transfer. Publications on modern laboratory techniques in the energ sciences will be published. Post-graduate courses in solar energy, petroleum technology, geothermal energy in Europe, Asia and Africa are also programmed.

5. Integrated natural resources research

General areas of competence and activity

224. The above description of activities and work programmes has been made according to the three areas - minerals, energy and water, with which the present report is concerned. It should, however, be stressed that UNESCO has been promoting for some 15 years an integrated approach to the study of natural resources. This has mainly been activated through the development of the methodology of integrated surveys, which was first started under the Arid Zone Research Programme, with the object of providing scientific basis for comprehensive utilization of natural resources for development purposes.

Outline of work programme

225. Research activities are undertaken under the following specific programme:

(a) To collect, exchange and disseminate information on principles, methodology and techniques of integrated study of natural resources, including integrated natural resources surveys, acquisition, processing, storage, retrieval and display of natural resources data for better understanding of the natural environment and rational utilization of its resources;

(b) To develop and improve training of specialists in integrated natural resources research, study and management of natural environment, applied geomorphology and tropical ecology;

(c) To assist member States, upon request, in the development of their own national institutions and programmes in this field.

226. In this respect, multi-disciplinary missions will be sent, on request, to developing countries to study existing conditions and needs for natural resources research and also to assist in research activities and training of specialists. Co-operation with the United Nations Committee on Natural Resources and with other interested agencies, particularly with UNDP, will be maintained. All activities the field of integrated natural resources research will be closely co-ordinated with the work on the new intergovernmental and interdisciplinary programme on man and the biosphere, which will be devoted to the study of interrelationship between man and the environment and to the problems relating to rational use and conservation of the resources of the biosphere.

6. Conclusion

227. Taking into consideration the constitutional and historical development of the Organization's activities related to the development of mineral, water and energy resources, UNESCO concentrates its current programme and activities towards:

(a) Promoting international co-operation between Member States in scientific and technological research;

(b) Stimulating the advancement of scientific and technological information and knowledge, through scientific seminars and symposia and through the exchange of documentation;

(c) Collecting and compiling scientific data and scientific information related to the basic phenomena and processes through publications and preparation of scientific maps;

(d) Co-operating with and supporting the activities of the international non-governmental scientific organizations concerned;

(e) Promoting and organizing the training of scientists, engineers and technicians through national, regional and international courses, seminars, fellowships and through the production of appropriate training material;

(f) Assisting member States in the creation and strengthening of institutions for research, integrated studies, documentation and training and in the organization of scientific research and oriented field studies in the following fields and disciplines related to natural resources:

(i) Mineral resources - applied and basic geology applied geophysics, geochemistry, geomorphology (including data processing methods);

(ii) Water resources - surface and sub-surface hydrology, limnology (including remote sensing, automatic processing and analysis of data, mathematical models and system analysis);

(iii) Integrated natural resources research - methodology, pilot projects and research on soil-plant-water relationships, coastal erosion;

(iv) Energy resources - solar energy, geothermal energy, hydraulic engineering, energy conversion.

E. WORLD HEALTH ORGANIZATION (WHO)

228. Water resources as a vital part of the total environment are a complex subject involving various fields of interdependent activities. The interest and responsibilities of WHO in this field relate to the far-reaching impact of water resources, its uses and abuses on the human environment and ultimately the health of nations. The focus of WHO environmental health interest and responsibility in water resources development is on the utilization of the resource for rural and urban water supplies and wastes disposal as a means of preventing and controlling communicable disease, and for promotion of physical, mental and social well-being.

229. The basis for WHO's action in this field is to be found in the relevant articles of its Constitution, particularly article 2 dealing with the Organization's functions, and in a number of resolutions adopted over the years by the World Health Assembly and the Executive Board of WHO. Reference may be made in this connexion to resolution WHA 1.38, in which the First World Health Assembly gave top priority to work in the field of environmental sanitation, on the same level as malaria, maternal and child health, tuberculosis, venereal diseases and nutrition; WHA resolutions 11.27, 12.48, 17.40 and 19.50 dealing with assistance in environmental sanitation and the development of community water supply programmes; WHA resolution 21.36 requesting the Director-General to provide for continuing leadership in this field, with particular reference to rural water supply programmes; and WHA resolution 23.60 of May 1970 recognizing WHO's leading role in the prevention and control of environmental factors adversely affecting human health. 11/ During the last two years, three further resolutions on community water supply and water quality in international water resources were adopted by the World Health Assembly: WHA resolutions 24.55 and 25.35, requesting the Director-General to continue to accord high priority to assistance to the developing countries in improving their rural and urban water supplies; and WHA resolution 25.43 requesting the Director-General to collaborate with member governments and appropriate international bodies in developing a system of surveillance of water quality and other measures to deal effectively with international water pollution problems with emphasis on the public health aspects.

230. At the United Nations Conference on the Human Environment held in June 1972, the environmental groups recommended that WHO should increase its efforts to support Governments in planning for improving water-supply and sewerage services through its community water-supply programme, taking account of, as far as possible, the framework of total environment programmes for communities. In addition, they recommended that development assistance agencies should give higher priority, where justified in the light of the social benefits, to supporting Governments in financing and setting up services for water-supply, disposal of water from all sources, and liquid waste and solid waste disposal and treatment as part of the objectives of the Second United Nations Development Decade.

11/ See for the text of these resolutions Handbook of Resolutions and Decisions of the World Health Assembly and the Executive Board, eleventh edition, covering the period June 1948 to May 1970 (Geneva, 1971).

231. The future needs of developing countries in this field of WHO concern are tremendous. In recognition of this, WHO has worked closely with other international and bilateral agencies to mount a more vigorous programme. Targets for the Second United Nations Development Decade established by WHO point to the need of over $13,000 million of capital investment for community water-supplies and $7,000 million for sewerage. This has stimulated a closer co-operation and co-ordination between WHO and IBRD, which have recently joined forces in a co-operative programme to carry out sector studies and to identify and assist Governments of member States in their responsibility for preparing water-supply, waste management and water pollution projects that will ultimately improve the health of their people.

232. Seventy-two per cent of all people in developing countries live in rural areas. A study in 1971 of 90 selected countries indicated that only 12 per cent of the rural population were served by a community water-supply in 1970. In response, the Twenty-fifth World Health Assembly drew attention (A25/B/Conf. Doc. No. 13, 20 May 1972) to the special needs of the rural sector and recommended that member States "take such steps as would lead to increased allocation of resources to rural water-supplies". The target suggested was 25 per cent of the 1980 rural population to have reasonable access to safe water.

233. The major focus of WHO activities is at the country level providing direct assistance to Governments at their request in the fields of water-supply, waste disposal, water pollution control, including that of estuaries and coastal waters, and water quality in international bodies of water. Such programmes are primarily in the form of direct assistance through the placement of sanitary engineers in countries to help in the development of better rural and urban supplies, control of quality and in waste water management. As of 1971, there are approximately 245 field projects related to water resources, in 90 member countries, that are supported by the WHO regular programme and by UNDP and IBRD funds. Among the major programmes are the pre-investment projects in water supply, sewerage and water pollution, financed with UNDP assistance. There are now 25 such projects in operation in all regions of the Organization.

234. Equally important are WHO's programmes in training, research and development. These are carried out through fellowships, assistance to local institutions, publications and seminars. Training is an integral part of every community water-supply project. WHO has established international reference centres on community water-supply and waste management, whose functions are to develop and refine criteria for design and operation of community water-supply facilities, especially in developing countries; to provide technical services for the comparison and adaptation of designs and operational procedures; to establish and promote the use of uniform methods of analysis for effluents from waste water treatment plants and for industrial waste water; to test the practical usefulness of new methods and procedures; to disseminate results of investigations and related information; and to train personnel, especially for the developing countries.

235. The long-term programme of WHO in the field of water resources is encompassed within the Director-General's report entitled "Problems of the human environment" and is summarized in the table which appears at the end of this submission. Briefly, in relation to water resources, the objectives are provision of adequate and safe water-supply for basic provision of water essential for human consumption and for the prevention and control of disease in rural and urban communities, including the setting up of health-related standards and guidelines for planning, design, operation and maintenance of rural and urban community water-supply and waste disposal systems; reduction of environmental pollution to permit optimal economic development without creating hazards to health or disturbances in the ecological systems; providing guidelines and assistance for the establishment of national policies, programmes and institutions for water-supply and waste disposal.

236. The main organizational units active in the water resources field are the Community Water Supply and Sanitation, Environmental Pollution, and Pre-Investment Planning Units within the Division of Environmental Health. The specific functions of these units which provide programme content are presented in Official Records of the World Health Organization, No. 196.

237. The Organization has at its disposal a large trained and experienced staff at headquarters and in regional offices and field operations, to enable it to implement these programmes. The staff includes sanitary engineers, scientists, technical officers and sanitarians as well as hydrogeologists and hydrologists. These categories of personnel are further complemented by additional staff under the WHO/International Bank for Reconstruction and Development (IBRD) Co-operative Programme, composed of organization and management consultants, financial analysts and an economist.

238. In view of the actual and potential health implications involved in the general field of water resources development, other units of the Organization are also involved either directly or in collaboration with the above-named units. These include the Division of Communicable Diseases, the Division of Malaria Eradication, the Division of Non-communicable Diseases, the Division of Strengthening of Health Services, and Vector Biology and Control. In addition, at all stages, close co-ordination exists with a large number of agencies, particularly in the United Nations family. 12/ Participation in the Sub-Committee on Water Resources Development of the ACC provides for harmonizing actions and policies with other United Nations agencies.

12/ Organizational Study on Co-ordination with the United Nations and the Specialized Agencies (extracts from Official Records of the World Health Organization, No. 181, June 1970, pp. 87-93)

239. The technical assistance given by WHO to Governments of member States on rural water-supply has in the past been closely associated with financial and material assistance provided by UNICEF for the same purpose. A total of 96 countries have so far received such co-ordinated assistance from the two organizations. The emphasis in WHO and UNICEF activities has shifted in recent years from assistance to small groups of communities to assistance in developing and implementing country-wide programmes (see A 25/29, p. 12).

240. WHO responsibilities in the field of water resources relate specifically to use of water for human consumption and the protection of human health. WHO, through programme activities, exercises primary responsibility in the areas of rural and urban community water supply, waste water and storm drainage, and in water-related disease control, as well as for specific activities in water quality, wastes management and water pollution, and coastal and estuary water quality. Further, WHO has a major interest (i.e. responsibility shared with other agencies) in economic and institutional development, and the health aspects of water re-use, man-made lakes and desalination. In other areas a collaborative role is played.

WHO'S LONG-TERM PROGRAMME ON ENVIRONMENTAL HEALTH - SUMMARY OF PROJECTS

A. BASIC SANITARY MEASURES

Global objective

The provision of essential environmental sanitation in rural and urban situations, particularly for developing countries, as a means of preventing and controlling communicable disease and for the promotion of mental and social well-being.

- A.1 Levels and trends in the availability and quality of water supply and waste-disposal services; and guidelines for establishing national information systems.
- A.2 Guidelines for the sanitary planning, design, operation and maintenance of community water supply and waste-disposal systems.
- A.3 Guidelines for the planning, design and operation of rural water supply and waste disposal.
- A.4 Guidelines for interim sanitary measures under conditions existing in developing countries.
- A.5 Criteria and guidelines for food hygiene and quality control.
- A.6 Guidelines for vector control through environmental modification by engineering design and practice.
- A.7 Guidelines for mobilizing community participation in the provision of basic sanitary measures.
- A.8 Guidelines for solid-waste management.
- A.9 Guidelines for the sanitary aspects of waste recycling.

B. CONTROL OF ENVIRONMENTAL POLLUTION AND OTHER HAZARDS

Global objective

Reduction of environmental pollution to levels which permit optimal economic development without creating hazards to health or disturbances in the ecological systems.

- B.1 Levels and trends of urban and industrial air pollution and methods of measurement.
- B.2 Air quality criteria and guides; health effects of air pollution; and guidelines for air quality management.
- B.3 Levels and trends of deleterious substances in drinking-water; and development of criteria and guides.
- B.4 Guidelines for the control of deleterious substances in drinking water.
- B.5 Levels and trends of water pollution; criteria and guides for water quality; and guidelines for water quality management.
- B.6 Levels and trends and health effects of coastal pollution.
- B.7 Levels and trends of soil and land pollution of health significance.
- B.8 Levels and trends and criteria and guides on environmental radiation; and guidelines for prevention and control.
- B.9 Levels and trends of and criteria and guides for community noise.
- B.10 Identification and control of new environmental hazards (consumer products and chemicals).

C. URBAN-INDUSTRIAL ENVIRONMENTAL HEALTH

Global objective

The establishment of optimal environmental conditions in urban-industrial areas to prevent or control adverse effects of urbanization and industrialization.

- C.1 Levels and trends and evaluation of health effects of crowding, congestion, substandard housing and urban stress.
- C.2 Criteria and guidelines on the hygienic quality of housing, including housing design.
- C.3 Criteria and guidelines for urban and regional planning applicable to different types of physical and social settings.
- C.4 Criteria, guidelines and planning applicable to environmental health in urban neighbourhoods.
- C.5 Guidelines for environmental health aspects of urban transport systems and centres.
- C.6 Levels, criteria and guides for environmental exposures of workers in industry and agriculture.
- C.7 Guidelines for safeguarding the health of workers through design and daily operations.

D. ENVIRONMENTAL HEALTH SERVICES AND INSTITUTIONS

Global objective

Availability of an infrastructure and institutions capable of conducting effective planning and management of environmental health programmes, and of integrating these into national or regional health and development programmes and policies.

- D.1 Levels and trends of environmental health conditions; needs and programmes to provide the basis for the planning of national and international action.
- D.2 Guidelines for environmental health planning and its relationship to national health and general development planning.
- D.3 Guidelines and assistance for the establishment of environmental health services and institutions.
- D.4 Guidelines for the establishment of national policies, programmes and institutions for water supply and waste disposal.
- D.5 Guidelines for the evaluation of social and economic benefits resulting from improvement in basic sanitary services.
- D.6 Guidelines for environmental health measures in disasters and emergency situations.
- D.7 Guidelines for the planning and organization of environmental pollution control.
- D.8 Environmental health manpower - guidelines for its development and utilization.
- D.9 Establishment and assistance to research and training centres in environmental health.

.../...

F. INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT (IBRD)

241. The spheres of competence of the institutions of the World Bank Group as set forth in their Articles of Agreement include, among others, the development of productive facilities and resources in its less developed member countries. The Group's operations in the field of natural resources fall within that general mandate.

242. The primary activity of the World Bank Group is the financing of specific projects whose merits can only be judged in the light of their contributions to the development of the national economy and of the particular economic sector to which they belong. It is therefore necessary for the Bank to consider individual projects within the framework of national and sectoral requirements and priorities. As a result, lending programmes have been prepared for most of its developing member countries. They are, however, internal working documents by nature subject to continuous revision as a result of changing circumstances, including such factors as the internal mobilization of resources within the country concerned and the availability of funds to the Bank Group (in particular to IDA). Indeed these lending programmes are not work programmes in the sense that most of the other agencies have such programmes, but rather internal planning guides. On the other hand, in line with its over-all approach, the Bank Group has been preparing and issuing in recent months a number of sector working papers that set out in general terms the estimated volume and direction of its operations in various major economic sectors. Among these, the sector working papers most closely related to the subject matter of this report are those entitled "Water-supply and Sewerage", "Electric power" and "Industry".

Water resources

243. Water-supply projects undertaken by the Bank are expected to increase sharply during the 1970s. In the period 1969-1973, financing of $495 million on some 40 operations is envisaged as compared with $127 million for 10 operations in 1964-1968. Co-operative arrangements entered into recently between the Bank and WHO under which the Bank will contribute to the expansion of WHO's new Pre-investment Planning Unit in its Environmental Health Division, will also assist the Bank to expand its operations in these fields.

244. In the area of research for water-supply, the Bank is seeking to develop better data to ensure that the best possible criteria are used for allocating scarce funds among competing projects. Other research projects are to improve water demand analysis and forecasting and to identify pricing policy options for water.

245. In respect of water resources, mention must also be made of the Group's activities in irrigation, drainage and flood control. Lending in these fields during the fiscal years 1969-1972 will amount to roughly $600 million. While forecasts have not yet been completed, it is expected that lending for these purposes will continue to expand in absolute terms although not as a proportion of total agricultural lending, since increasing emphasis is being placed on on-farm investments and agricultural industries. Also, the Bank is increasingly financing groundwater development through credit programmes reaching individual farmers.

Energy resources

246. The level of lending for electric power projects envisaged by the Bank for the five-year period 1972-1976 is $2,540 million, about 24 per cent above the actual figure for the previous five years. Substantial increases are expected in the number of borrowing countries and of projects. In many countries the Bank will be assisting the power sector for the first time.

247. Greater sector work in this field will be required, as the number of loans and of countries involved increases. Member countries are addressing themselves increasingly to the broader issues of national energy policy and are seeking Bank assistance for this purpose. Areas in which it is foreseen that borrowers will require greater help from the Bank include system planning, which encompasses market forecasting and the selection of least-cost alternatives, evaluation of the structure (as distinct from the level) of electricity tariffs, village electrification, and environmental problems.

Mineral resources

248. In the field of mineral resources no over-all forecasts have yet been made. However, increased attention to mining in the Bank Group's work is likely to result in increased operations in this field.

Industry

249. Information on this subject has been included in view of the impact of the industrial sector on the development of natural resources. It is estimated that for the years 1972-1976 aggregate new loan and equity commitments by the Bank Group for manufacturing will exceed $3,000 million, almost two and a half times the level reached in the years from 1967-1971.

250. The Bank will continue to support development finance companies in several of its member countries. It is to be expected that some of the operations of these companies, as in the past, will relate to the development of natural resources. The level of operations for this purpose, however, cannot be estimated with any precision.

G. WORLD METEOROLOGICAL ORGANIZATION (WMO)

251. The field of natural resources development, as defined by the second session o the Committee on Natural Resources, concerns the competence and work of the World Meteorological Organization, primarily in the field of water resources which has, however, an important bearing on the development of energy resources through hydropower development. There are also some aspects of meteorology and climatology which are fundamental for any development of natural resources. In addition, the use of wind and solar radiation for energy production in the future may become of considerable importance. The progress in weather modification experiments also holds special implications for water resources development. As evident from the relevant articles of WMO's Convention, several elements of the water cycle and relevant activities for the development of these elements as natural resources are embodied in the basic objectives of the Organization. Thus, WMO is the only international organization of the United Nations family that has such specific primary objectives indicated in its basic statutory documents.

252. As early as 1955, the WMO Congress decided that in the absence of any other specialized agency dealing with the technical aspects of hydrology, it was the duty of the World Meteorological Organization to do as much as possible to fill the gaps

253. A more definite programme for WMO in this field was established by the Fourth World Meteorological Congress in 1963 which decided that "the World Meteorological Organization should play its appropriate part in the meteorological and hydrological aspects of the Priority Programme in Water Resources, within the framework of the United Nations Development Decade, particularly, with respect to:

(a) Fostering and guiding the establishment and expansion of networks;

(b) Standardization of instruments, methods of observation etc. and the preparation and distribution of guidance material; and

(c) Training of manpower required to meet the expansion of national data gathering and other services." (resolution 34 (Cg-IV))

254. The WMO Commission for Hydrology was established by WMO in 1959. Its terms of reference encompass all aspects of operational hydrology. The following definition of the term "operational hydrology" establishes WMO's responsibilities in the field of hydrology and water resources, and should facilitate co-operation between member and between international organizations by a clearer understanding of WMO's programme in this area: measurement of basic hydrological elements from networks c meteorological and hydrological stations; collection, transmission, processing, storage, retrieval and publication of basic hydrological data; hydrological forecasting; development and improvement of relevant methods, procedures and techniques in: (a) network design; (b) specification of instruments; (c) standardization of instruments and methods of observation; (d) data transmissic and processing; (e) supply of meteorological and hydrological data for design purposes; (f) hydrological forecasting. The role of WMO in promoting international

co-operation in operational hydrology, as defined above, pertains in varying degrees to the following elements: precipitation; snow cover; evaporation from lakes, river basins and reservoirs; temperature and ice regime of rivers, lakes and reservoirs; water level of rivers, lakes, reservoirs and estuaries; water discharge of rivers; sediment discharge of rivers; soil moisture and depth of soil frost; quality of water; groundwater.

255. The WMO Congress has established an Advisory Committee for Operational Hydrology which provides an effective means through which Hydrological Services of Members can offer advice to Congress and the Executive Committee on policy matters concerning: collaboration between services responsible for operational hydrology at regional and international levels; participation of Hydrological Services in the planning and implementation of WMO programmes with hydrological aspects; collaboration of Hydrological Services with Meteorological Services in the promotion of regional and international approaches to the solution of problems of operational hydrology (resolution 13 (Cg-VI)).

256. The World Meteorological Organization bears responsibility for most of the activities of the International Hydrological Decade in the field of operational hydrology, besides a number of other projects. It collaborates in projects in hydrology and water resources and related environmental questions of the United Nations, its organs, the specialized agencies and other international organizations, in accordance with resolution 14 (Cg-VI).

257. In order to provide adequate secretariat support, the Congress established the Department of Hydrology and Water Resources, which reports directly to the office of the Secretary-General of WMO.

Other responsibilities

258. Four other WMO technical commissions bear responsibility for many important aspects of water and energy reosurces. The Commission for Special Applications of Meteorology and Climatology and the Commission for Instruments and Methods of Observation are responsible for standardization of basic networks and observations for climatological purposes including observations of precipitation and temperature, which are fundamental for any planning of water resources development both for irrigation and hydroelectric purposes. The Commission for Agricultural Meteorology is concerned specifically with some irrigation aspects of water resources development. The Commission for Atmospheric Sciences is responsible for all questions related to weather modification which has important implications for water resources in the future.

259. The activities of WMO in the field of natural resources development, which can be designated as "operational" in the sense used by the Committee (namely field activities), include, in particular, the technical assistance activities of the Organization which are carried out by WMO mainly within UNDP. Assistance has been provided to countries in the development of their meteorological and hydrological servcies, the training of personnel and application of meteorological and hydrological information to related fields for the general improvement of economic and social conditions. A major part of that assistance has been provided to the operational activities in the field of water resources development and, to a lesser degree, development of energy resources. The Organization is, at present, acting as executive agency for 10 large Regional and country projects financed by UNDP.

260. The WMO programme of the World Weather Watch and the associated Voluntary Assistance Programme (VAP) are also operational activities, funded entirely within the WMO regular budget which, through the global observing system, global telecommunication system and global data processing system, provide services important for the most economic and productive development of water resources, through forecasts of atmospheric phenomena and stream-flow.

Programme of work

261. Most of the regular budget activities related to hydrology and water resources development are carried out mainly by the WMO Commission for Hydrology (CHy). Other relevant programmes of work of other WMO bodies are described below. At its fourth session, held at Buenos Aires in 1972, the Commission prepared its future programme of work (1972-1976).

Operational Hydrology Programme

262. The plan of action for the Programme is composed of activities in the following functional fields:

(a) International standardization efforts concerning instruments and methods of observation, data transmission and processing for all basic hydrological elements;

(b) Promotion, by internationally organized projects, of new methods of data collection and of hydrological analysis for operational purposes;

(c) Information on established solutions to institutional and organizational problems encountered by hydrological services and on the importance and impact of such services on a national economy provided in particular for the benefit of developing countries;

(d) Supporting activities, such as the preparation of the glossary, UDC, education and training of hydrologists, sponsoring of symposia and collaboration with other international organizations on problems of interest to hydrological services.

263. The main substance of these activities is within the WMO programme on the interaction of man and his environment. Adequate interconnexion and use of support from all the other WMO programmes, namely, World Weather Watch, training and research and technical co-operation, will be continued and rendered by way of co-operation with other WMO Technical Commissions, namely, Basic Systems, Instruments and Methods of Observation, Atmospheric Sciences, Aeronautical Meteorology, Agricultural Meteorology, Marine Meteorology, Special Applications of Meteorology and Climatology and with WMO regional associations.

Implementation of the Operational Hydrology Programme

264. The Commission for Hydrology has a machinery of working groups composed of rapporteurs. Seven working groups and 39 rapporteurs carry out work on specific tasks which fall under the following main subjects:

(a) WMO Guide to Hydrology and WMO Technical Regulations (including standards);

(b) Meteorological instruments and methods of observation for hydrological purposes. (These studies are conducted by WMO, through the joint efforts of the Commission for Hydrology, Instruments and Methods of Observation, and Agricultural Meteorology;

(c) Hydrological instruments and methods of observation;

(d) Hydrological data treatment, including hydrological codes, data collection, transmission, processing, storage and retrieval;

(e) Hydrological forecasting, including forecasting of floods from tropical cyclone rainfall;

(f) Hydrological design data for water resources projects; and

(g) Others, including Casebook on Hydrological Network Design Practices; application of WWW to hydrology; atmospheric vapour flux; maps and mapping techniques for hydrological purposes; terminology in hydrology; training in hydrology; remote sensing of hydrological elements.

265. The relevant programmes of work of other WMO technical commissions include: cloud physics and weather modification, numerical weather prediction, wind, climatic fluctuations, radiation climatology and energy balance climatological networks, effects of soil cover, micro-meteorological aspects of irrigated agriculture, droughts, and the preparation of the World Climatic Atlas.

Regional co-operation and co-operation with other international organizations

266. The co-operation of WMO in hydrology and water resources development at the regional level is organized through its six regional associations. Five of these associations have appointed regional working groups on hydrology, each one of which deals with the specific hydrological and water resources development problems of its respective region. The membership of these working groups is composed of experts both from meteorological and hydrological services of members.

267. A number of projects at the regional level are being conducted in close co-operation with the United Nations regional economic commissions. In particular, co-operation with the Economic Commission for Africa resulted in several joint actions, mainly, in assisting developing countries in the improvement of activities in hydrology and water resources development. A similar arrangement is being continued with ECLA, ECAFE and ECE.

268. Co-operation with other international organizations in hydrology and water resources development within the field of competence of the Commission has been strengthened, in particular, in the IHD programme with UNESCO. The strengthening of WMO activities in operational hydrology and water resources development has increased co-operation with UNESCO and FAO, in particular, and with other non-governmental organizations concerned.

H. INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

269. The activities of the International Atomic Energy Agency relating to natural resources help to further the Agency's main objective which, according to article II of its Statute, is to "seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world". The Agency's relevant responsibilities concern nuclear materials, nuclear power and the use of nuclear energy and nuclear techniques to improve the utilization of many kinds of natural resources such as water (by means of nuclear desalination and isotope hydrology), forests, agriculture and industrial products (nuclear prospecting, peaceful nuclear explosions etc.).

270. The relevant responsibilities of the Agency with regard to nuclear materials relate to the exploration and development of uranium resources and other nuclear raw materials to meet the needs of its member States. These needs for expanding energy can be twofold: (a) to develop uranium resources for their own peaceful atomic energy programmes; (b) to export, to meet the needs of expanding nuclear power in industrial countries.

271. The Agency's concern with nuclear raw materials is recognized in article III "Functions", and article IX "Supplying of materials", of its Statute. In the stricter meaning of natural resource development, the Agency's competence in nuclear raw materials development ranges from initial geological favourability studies through exploration, prospection, evaluation, mining and ore processing to the ore concentrate stage. Reviews of world uranium resources and demand also come within the Agency's competence. Other Agency programmes continue into the nuclear fuel cycle.

272. Although it is not strictly true to say that nuclear power is a natural resource it must be considered in connexion with natural reosurces as it is an alternative to other possible natural power resources, such as hydro-electric schemes, coal or oil-fuelled power plants and geothermal power plants. In effect, the power programme of any country should consist of a mixture of different types of power source as they each have different advantages and disadvantages.

273. Economic and Social Council resolution 1550 (XLIX) recalled the Agency's interest in there being a sufficient supply of nuclear metals and while reaffirming the primary role of the United Nations to conduct multi-mineral or single mineral surveys, recognized the special competence and responsibility of the Agency to conduct surveys for nuclear metals as requested by Governments of member States. It further requested the United Nations and the Agency to consult together to avoid duplication of effort and to foster co-operation in survey programming.

274. Technical co-operation between the United Nations Resources and Transport Division has been successfully continued wherever appropriate. The existing division of responsibilities is satisfactory in the Agency's view. No other organization within the United Nations system is at present involved. (If uranium ore processing plants are built as part of a UNDP project, UNIDO might also be involved.)

275. The activities of IAEA concerning nuclear materials, nuclear techniques to improve the utilization of other natural resources and the use of nuclear energy are described below. First, however, mention may be made of the Fourth 13/ International Conference on the Peaceful Uses of Atomic Energy, which was held at Geneva in September 1971 and was attended by about 4,000 delegates and observers. The aim of the Conference was to provide public officials, economists and planners as well as technologists with a comprehensive review of the practical applications of atomic energy. The subjects dealt with included nuclear power and special applications, nuclear fuels, fuel cycles and materials, health, safety and legal aspects of atomic energy, applications of isotopes and radiation, international and administrative aspects of nuclear energy and aspects of nuclear technology of interest to developing countries. The proceedings of the Conference are being published and will all be issued by the end of 1972.

1. Nuclear materials

276. The Agency acts as a medium for the interchange of information through organizing scientific meetings and publishing the proceedings for general usage. In recent years, in co-operation with other organizations as appropriate, it has organized symposia on uranium ore processing, exploration instruments and radiological health and safety in uranium mining and milling. Smaller panel meetings on low-grade uranium ore processing, uranium geology and uranium exploration methods have also taken place. A consultant group recommended minimum performance specifications for uranium prospecting and evaluation instruments.

277. A working group jointly sponsored by ENEA and the Agency reviews the world's uranium resources, production capacity and demand at roughly two-year intervals and these reports have become widely accepted as authoritative statements on this subject. Research contracts on uranium exploration problems, ore-processing etc., have been granted in member States and such support of research is expected to increase. Where requested, the Agency provides advisory missions, experts, equipment, fellowship training and training courses in member States in uranium exploration and development. In the period 1959-1971, 65 experts were provided to 29 countries and over 150 fellowships were awarded. Two training courses were organized. Two large-scale UNDP projects for uranium exploration, involving seven experts and approximately $800,000 of UNDP funds are being executed by the Agency in Pakistan and Greece.

278. In 1973-1974, the general work programme is likely to be similar to that indicated above, but with the expected increase in world activity in uranium resources development towards the second half of the 1970s it may be expected to expand. A symposium on uranium resources is proposed to be held in 1974, together with smaller meetings on more specialized subjects. The ENEA/IAEA working group on uranium resources will continue with its work. A considerable expansion in the research contract programme is foreseen. An expansion on technical assistance activities is also foreseen for 1973-1974 and if present proposals are accepted, the Agency is likely to be executing four large UNDP projects on uranium exploration and evaluation at that time.

13/ The information is based on the Agency's budget for 1972 and programme for 1971-1976.

2. The uses of nuclear energy and nuclear techniques to improve the utilization of other natural resources

(a) Nuclear Desalination

279. The Agency, in continuing response to the interest of its member States in nuclear desalination, has become a focal point and the only organization in the United Nations system for matters relating to this subject. These activities have proved to be of great interest to developing countries, many of which are arid. The major nuclear desalination activities of the Agency are:

(a) Missions: upon request, the Agency sends Missions to Member States to assist in evaluating the potential of nuclear desalination as a means of creating a new fresh-water source. The Agency also assists in studies relating to the longer-range potential of desalination in connexion with agro-industrial complexes. One or two such Missions have been provided each year for the last few years and it is anticipated that four to six will be dispatched during 1973-1974;

(b) Long-range planning: the promise of nuclear desalination is associated with electric power production in dual purpose facilities which require 10 years or more to plan, finance, construct and bring to full operation. Long-range planning is therefore particularly important. The agency provides assistance from its own staff or experts through its Technical Assistance Programme to assist in formulating long-range nuclear energy programmes. One or two requests for assistance in long-range planning are anticipated in 1973-1974.

(c) Current developments: to keep its member States informed on nuclear desalination developments, the Agency periodically convenes panels and symposia; publishes proceedings of meetings, reports on the status of nuclear desalination, specific nuclear desalination studies and results of research contracts. During 1973-1974, a seminar or symposia and several meetings on specific topics are scheduled and at least two monographs on desalination will be published;

(d) Fellowships: under the Fellowship Programme, one or two are awarded each year in nuclear desalination. This will continue in 1973-1974;

(e) Research contracts: the Agency sponsors research by awarding contracts including several each year on specific nuclear desalination topics. During 1973-1974, it is expected four to six such contracts will be awarded.

(b) Isotope hydrology

280. The over-all objectives of the Agency's programme are: to encourage the use of isotope techniques as an additional tool for hydrological investigations · to promote the refinement of existing methods and to develop new techniques. The programme (including 1973-1974) consists of the following activities: participation as a subcontractor in UNDP(SF) water resources field investigations (executed by other United Nations organizations) applying environmental isotopes to hydrological studies; sponsoring technical assistance by providing equipment and associated expert advice as well as research contracts in isotope hydrology (almost wholly in developing countries); disseminating information on isotope hydrology through training programmes, symposia, panels, fellowships and advisory services; providing laboratory services for environmental isotope analyses to member States; conducting a limited amount of work on improvement of analytical methods; and organizing laboratory intercomparisons of environmental isotope measurements. On the Agency's staff there are experts of the appropriate scientific disciplines needed for carrying out this programme within the over-all Agency programme.

281. In acting as a subcontractor for isotope hydrological studies, the Agency focuses on using environmental isotopes as an important and sometimes crucial supplementary tool in the water resources investigations being carried out by other United Nations organizations. Interagency co-operation in such studies is especially productive in promoting the use of nuclear techniques in hydrology in a practical and beneficial way. In this connexion, however, it is desirable that increased liaison and informal instruction on the applications of nuclear techniques in hydrology be conducted between the Agency's Section of Isotope Hydrology and staff members of other United Nations agencies that are responsible for planning water resources studies.

(c) Nuclear prospecting

282. The Agency is actively engaged in developing a programme on the use of nuclear techniques in the exploration and exploitation of other minerals. The successive stages from mineral prospecting through the evaluation, development and exploitation of mineral deposits all require extensive effort and costly investments. In these operations, nuclear techniques, which are efficient and cheap, are being increasingly adopted. The Agency keeps abreast of the progress in this rapidly developing field by holding various kinds of meetings and by direct consultation with leading experts. It provides considerable support to its developing member States, both in their research and development efforts and in their attempts to apply nuclear techniques in various areas of the mineral industry.

283. Technical assistance projects, which have been and are being implemented within recent years, range from relatively small projects, involving the provision of suitable experts and relatively low cost portable instruments or instrument modules which could be assembled within a particular country for field work, training and demonstration, up to long-range costly projects involving assistance in setting up a modern analytical laboratory employing techniques such as radio-chemistry, neutron activation, X-ray fluorescence and on-line computer, which are usually financed both

by the receiving country and the Agency, and may take several years for successive building-up of instrumentation and personnel capability. Recently, the Agency awarded research contracts on the use of nuclear techniques in geochemical prospecting, and on the use of radioisotopes in flow studies with some reference to the transport of mineral slurries, both of which are organized as co-ordinated programmes.

(d) Peaceful nuclear explosions

284. The possibility of using nuclear explosions for developing or exploiting natural resources is another area in which the Agency is carrying out work, by arranging meetings and discussions on the subject.

(e) Nuclear techniques in food and agricultural programmes

285. The Agency, through the Joint FAO/IAEA Division of Atomic Energy in Food and Agriculture, located at Vienna, collaborates with FAO in exploiting nuclear techniques related mainly to the study of nature, movement and elimination of chemical and radio-active contaminants of the human environment, and in the more efficient use of natural resources.

3. Nuclear power

(a) Energy forecasts

286. The objective is to assess nuclear power prospects by preparing forecasts of supply and demand in regard to primary energy, electric power and nuclear power on a national, regional and world basis. Existing data will be analysed critically, evaluated and made available to member States through publications and training courses, and information for planning the implementation of safeguards will be provided.

(b) Economic evaluations of nuclear and conventional power

287. The objective is to provide evaluations and forecasts of investment and fuel costs for nuclear and conventional power stations and to carry out economic comparisons of these costs on a consistent basis in order to maintain an up-to-date picture of the present and future competitive status of nuclear power. The results of a series of surveys on the present status, future trends and methods of comparison of power costs have been made available to member States through publications, lectures at training courses, regional study groups and special advisory missions. In 1973, a symposium on the fuelling of nuclear power plants, with special emphasis on costs, is expected to be held. Both in 1973 and in 1974, reviews and lectures for training courses will be prepared.

(c) Nuclear power project implementation

288. The objective is to assist developing countries in the early stages of planning and implementing nuclear power projects in the following ways:

(i) Assistance in nuclear power planning: A series of training courses on the technical and economic aspects of nuclear power, reviewing critically the latest developments in technology and costs, has been held. Special missions and advisory services requested by Argentina, Brazil, Chile, Egypt, Greece, Korea, Pakistan, Peru, the Philippines and Thailand have in several cases contributed to the initiation of nuclear power programmes. A handbook covering the main steps in the implementation of a nuclear power programme is being prepared. It is expected that a number of requests for assistance will be received and met as far as resources of money and manpower permit. A training course on some aspects of the introduction of nuclear power is planned as well as a meeting on possible sources and methods of financing nuclear power projects.

(ii) Nuclear power market survey: Advisory missions in various developing countries have helped to ascertain nuclear prospects in special cases, but only very general forecasts have been made. No detailed comprehensive survey has as yet been carried out on a world-wide basis. A major market survey, initiated in 1972, will extend to 1973 since coverage in depth of about 12 countries is contemplated as a first step. An effort to carry out the survey in an additional ten countries may be considered for 1973 and 1974.

(iii) Small and medium sized reactors: A series of studies and reports have been produced which have indicated the desirability of some standardization and led to research agreements on this subject. This work will be continued to find out the real prospects of small and medium sized power reactors.

(d) Operation of nuclear power plants

289. The objective is to collect, analyse and publish annual reports on operating experience with nuclear power stations in member States, and to facilitate the exchange of information on means of assessing and improving the reliability of nuclear power stations. In 1970 and in 1971, an annual report was published which covered the operating experience in the previous year. By the end of 1974, the number of nuclear power stations in operation will be about 220, as compared with 98 at the end of 1970. It is believed that during this period commercial nuclear power will become firmly established because of the expected high availability factors and low outage rates. The Agency's activities will be directed to disseminating the knowledge available through reports and meetings.

Annex

SUMMARY OF EXPENDITURES IN THE FIELD OF NATURAL RESOURCES, 1970-1972

(in thousands of US dollars)

Organization or agency	1970			1971			1972 (estimated)			Increase (decrease) 1972/1971 (percentage)
	Regular budget funds	Extra-budgetary funds	Total	Regular budget funds	Extra-budgetary funds	Total	Regular budget funds	Extra-budgetary funds	Total	
United Nations	5,311	27,766	33,077	6,964	25,650	32,614	8,354	26,883	35,237	8.0
FAO[a/]	144	1,642	1,786	200	1,975	2,175	213	2,167	2,380	9.4
UNESCO	1,181	1,602	2,783	1,240	1,903	3,143	1,392	1,924	3,316	5.5
WHO	867	1,378	2,245	910	3,192	4,102	1,097	2,813	3,910	(4.7)
WMO	187	1,152	1,339	197	1,423	1,620	275	1,757	2,032	25.4
IAEA	1,702	858	2,560	1,759	1,247	3,006	1,981	1,632	3,613	20.2
Totals	9,392	34,398	43,790	11,270	35,390	46,660	13,312	37,176	50,488	8.2

Source: Report of the Administrative Committee on Co-ordination on expenditures of the United Nations system in relation to programmes (E/5153). This report also contains three subtables which break down the expenditures by organization and subprogramme. The subprogrammes are: (a) general development planning and policy; (b) fuel and power; (c) water resources (E/5153, pp. 52-54).

a/ In the opinion of FAO, the above table, isolated from the main report of expenditures of the United Nations system, does not give a full picture of FAO's involvement in the development and rational use of natural resources, notably water.

For organizations like FAO, which use the programme budgeting system, it is not easy to single out figures on individual ratural resources for which the work programmes have been prepared in an integrated manner. The correct picture in regard to FAO would be revealed only if the following figures quoted from the expenditure document mentioned above were additionally taken into account:

	1970		1972	
	FAO	WFP	FAO	WFP
Development, conservation and use of land and water resources	21,216	16,324	27,653	20,332

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CO-ORDINATION OF THE WORK OF THE UNITED NATIONS SYSTEM IN THE NATURAL RESOURCES FIELD AND PROGRESS IN THE IMPLEMENTATION BY THE UNITED NATIONS SYSTEM OF THE GUIDELINES FOR ACTION IN THE DEVELOPMENT OF NATURAL RESOURCES

Work programmes, spheres of competence, division of responsibilities and co-ordination measures

Report of the Secretary-General

Addendum

II. AREAS OF AGREEMENT AND PROBLEMS OF INTERAGENCY CO-OPERATION

1. In operative paragraph 1 of its resolution 1673 C (LII), the Economic and Social Council invited the Secretary-General to submit, in addition to the "outlines of the work programme and the sphere of competence of the organizations and agencies of the United Nations system in the field of mineral, water, energy and resources development", the "views of those organizations and agencies on the most rational division of responsibilities between them in these fields". The present chapter is devoted to the presentation of those views.

2. It was not altogether clear to the organizations whether it was the intention of the resolution that their views should be submitted separately or, in so far as possible, as common views. It was finally decided by the Administrative Committee on Co-ordination that it would be most useful to members of the Committee if the matters on which the organizations were in substantial agreement were described first, followed by their differing views on some matters on which agreement is still being sought. This has been done separately for water resources, on the one hand, and for minerals and energy on the other; additional statements of a general nature submitted by individual organizations are contained in annex I to the present chapter. It should perhaps be added that, while the problems

actually described below mostly involve the United Nations, the conclusion should not be drawn that problems are absent in other relationships, nor that this field is particularly full of problems of overlapping and duplication.

3. In the second place, the organizations were not entirely certain what was meant by "the most rational division of responsibilities between them in these fields". They have acted on the assumption that this did not imply a desire on the part of the Committee on Natural Resources or of the Economic and Social Council to obtain the views of secretariats on the desirability of modifying the constitutional responsibilities of the various organizations. As in other areas, however, the interpretation of those responsibilities is carried out in the first instance by policy-making organs at the intergovernmental level and next, by the secretariats who have to execute at the programme level the decisions taken by these organs. It is in this context that problems of the proper division of responsibilities and of co-ordination have arisen from time to time in the field of natural resources, and the organizations felt that they would be responding to the main intention of the resolution if they were to explain such problems clearly and frankly, together with the differing views that organizations entertained with regard to them. The following paragraphs have, therefore, been prepared in the light of this interpretation of the Committee's wishes.

4. If, on the other hand, the Council was seeking advice on a more fundamental division of responsibilities, without regard to the existing constitutional functions of the various organizations, the secretariats of the agencies are not in a position to submit such views without first consulting their respective intergovernmental policy-making organs, a step which they are ready to take if this was, in fact, what the Council had in mind.

A. Activities relating to water

Introduction

5. A number of organizations are involved in the various aspects of water resources development and approach it from the point of view of their different fields of competence: the United Nations, quite simply from that of water resources; FAO, from that of agriculture; WHO, from that of public health; WMO, from that of meteorology and operational hydrology; UNESCO, from that of science and research; IAEA from that of applied nuclear technology; and UNIDO, from that of industry. Hence, agencies and organizations concerned with such matters are obviously involved in the various aspects of water resources development as related to their primary activities. A clear-cut division of responsibility with regard to water activities is difficult and has not, so far, been achieved. Indeed many aspects of the development and rational use of water are interrelated and some overlapping of activities is probably unavoidable.

6. The areas of interagency contact are quite numerous and, as is well known, there have been difficulties of one kind or another for a long time. For these reasons permanent interagency machinery was set up as long ago as 1954. The Sub-Committee on Water Resources of the Administrative Committee on Co-ordination has met on an annual basis since that date to work out arrangements for interagency consultation and co-operation and to deal with specific problems, especially with regard to multidisciplinary projects in which more than one organization may have an interest.

7. The Sub-Committee took, as its starting point for improving programme co-ordination, the constitutional mandates of the various organizations and the policies and programmes approved by the legislative and governing bodies of these organizations. The responsibilities of each organization in the field of water resources are, in fact, reflected in the nature of its work programme which has evolved gradually over the years in accordance with the directives of its intergovernmental organs.

8. Within this general framework, the Sub-Committee on Water Resources has worked for the co-ordination and harmonization of these programmes and has dealt with specific problems of "who does what" as they have arisen. It has, thus, adopted an approach which has, in general, been pragmatic rather than theoretical. After a summary of the existing division of responsibilities, an indication will first be given of the areas in which the Sub-Committee has been successful in ironing out difficulties; those questions which still await solution will then be described.

Summary of responsibilities

9. The following statements regarding their responsibilities in the field of water resources have been submitted by the various organizations.

10. United Nations. The United Nations itself is represented in the field of water resources through the Department of Economic and Social Affairs. More particularly, on the substantive side, the work at Headquarters is done through the Resources and Transport Division (RTD) and the work in the regions, by the secretariats of the regional economic commissions - the Economic Commission for Africa (ECA), the Economic Commission for Asia and the Far East (ECAFE), the Economic Commission for Europe (ECE) and the Economic Commission for Latin America (ECLA). Technical assistance programmes in the Department are administered by the Office for Technical Co-operation (OTC). The Resources and Transport Division (RTD) has responsibilities in general regarding economic and institutional aspects of water resources development and use (water administration and law) and certain aspects of natural resources for which the United Nations has a primary responsibility (flood control, hydropower, navigation, international rivers and conventional desalination). The United Nations is also responsible for the exploration of groundwater resources and general water resource surveys. In addition, the Division is responsible for the substantive support of UNDP projects executed by the United Nations in the field of water resources.

11. The United Nations Water Resources Development Centre, as an integral part of the Resources and Transport Division, in accordance with resolution 1033 D (XXXVII) of the Economic and Social Council, has the following responsibilities: (a) to keep the interrelated problems of water resources development and utilization under continuous review; (b) to pay special attention to the administrative and legislative problems related to water resources development in developing countries; (c) to foster the diffusion of relevant information among Governments and interested organizations; (d) to foster, in the case of international rivers, as appropriate, the collection of relevant data, the study of tentative programme schemes and the bringing together of the parties concerned; (e) to promote efforts towards the formulation of principles of international law applicable to water resources development; (f) to facilitate the co-ordination of activities between Headquarters and the regional economic commissions; (g) to perform, as required, on behalf of the Administrative Committee on Co-ordination, the organization and secretarial functions for the interagency and ad hoc meetings on water resources development and utilization.

12. Economic Commission for Africa. The Economic Commission for Africa organizes existing data on the water resources of the region. It assists member States in the establishment or expansion of hydrological observational networks, is concerned with questions of training and manpower, studies the development potential of national and international river basins and provides advisory services to governments and intergovernmental agencies regarding the development of these data and services.

13. Economic Commission for Asia and the Far East. The Commission promotes the integrated development of river basins through the introduction of sound policies, long-range national master plans and the necessary research and training. It is also concerned with the development of international river basins, in particular with the lower Mekong basin, and questions of the control of damage caused by typhoons and cyclones, which are of common concern to countries in the

Pacific and Indian Ocean regions. It is concerned with the hydrological aspects of water resources development and provides assistance in this field. It also acts as a focal point and clearing house for the dissemination of information on water resources development in the region.

14. Economic Commission for Europe. Through its series of technical intergovernmental committees, ECE deals with the industrial, agricultural and navigational uses of water in such fields as those of steel production, coking, chemicals, hydroelectric power and inland water transport. Its Committee on Housing, Building and Planning is concerned with the domestic and recreational uses of water. The recently established Committee on Water Problems, in a horizontal approach, is studying the economic development of water resources for the multipurpose use of water and the control of water pollution. Finally, the new ECE initiative in its priority area of environmental problems stresses water pollution problems.

15. Economic Commission for Latin America. The ECLA examines the role of water resources in present and future economic and social development. It co-operates with and advises Governments in the formulation of projects and plans on water development, giving special emphasis in the analysis of the corresponding economic and social aspects. The Commission, furthermore, promotes the investigation of water resources, the accumulation of knowledge concerning them and the identification of the possibilities and problems involved in their development.

16. United Nations Industrial Development Organization. The primary role of UNIDO lies in promoting and accelerating the industrialization of the developing countries with particular emphasis on the manufacturing sector.

17. Water is well recognized as a crucial factor in industrial development with regard to many types of manufacturing processes as well as in its use as a means of low-cost transportation and for other infrastructural measures essential to the development of certain types of industry. Furthermore, the water used in manufacturing and, in many cases, other materials not fully utilized in industrial processing are discharged into waterways. In this context, UNIDO is interested in both the quantity and quality of water utilized for industrial purposes.

18. The programmes of UNIDO in the field of water resources development include the water requirements of industry, the recycling and reuse of water, and water pollution and industrial waste disposal; the training of national personnel is also included.

19. United Nations Development Programme. The Programme provides assistance for preinvestment projects and technical assistance for a wide range of activities, including resource surveys, feasibility studies, applied research, institutional support, training projects and seminars. For water resources development projects falling within these categories the actual execution of its assistance is normally entrusted to the appropriate organization - the United Nations or one of the other organizations of the United Nations family which UNDP designates as executing agency.

20. Under new procedures which became effective in May 1971, the "country programming" approach is being progressively introduced, allowing developing countries with reasonable assurance to plan ahead the assistance requirements they foresee arising from their development objectives. Thirty-five country programmes have so far been approved by the Governing Council, many, if not most, of which contain projects, large and small, dealing with aspects of water resource development. Approval in principle of a given project, as part of a country programme, does not obviate the necessity of working out a detailed project document which is then approved for signature.

21. For Governments whose country programmes have not yet been approved, projects are approved on an individual basis on the understanding that they are consistent with the Government's development priorities which will be reflected in its country programme when presented.

22. United Nations Children's Fund. Aid by UNICEF is provided chiefly for health, nutrition, education and vocational training and other types of programmes related to the needs of children. The Fund frequently co-operates with WHO on projects concerning rural water-supply and waste disposal.

23. World Food Programme. This programme, undertaken jointly by the United Nations and FAO, assists economic and social development, mainly through contributions in kind; water projects are included in its work.

24. International Labour Organisation. This agency is interested in water resources projects with regard to the employment generating effects of water development construction. Wherever feasible, the ILO is interested in promoting labour-intensive methods for greater employment and the economical use of skills that are either scarce or obtainable only at high cost. Direct participation by the ILO in United Nations water projects has been limited.

25. Food and Agriculture Organization of the United Nations. The Organization is generally responsible for agricultural development, including forestry and fisheries. In view of the primary importance of water as a basic resource for agriculture, the functions of water inventory, water development and water use have their place in the Organization's central area of activities.

26. They include special sectoral responsibilities in irrigation and drainage, the reclamation of agricultural land (by the control of salinity and waterlogging, swamps and tidal land reclamation), flood protection and the provision and qualitative conservation of water for livestock. Responsibilities in the forestry sector relate particularly to the effects of watershed management on the water yield of upper catchments; in the inland fisheries sector, to the development and rational management of fishery resources, the protection of aquatic resources and all aspects of fisheries research.

27. For the implementation of these functions, the Organization makes use of specialized expert services and recommends policies, techniques, legal and institutional measures for developing effective water resource inventories and for development and management within the framework of agriculture, forestry and fisheries.

28. United Nations Educational, Scientific and Cultural Organization. The main activities of UNESCO in the field of water resources are concentrated in four areas:

(a) Providing the international secretariat for the International Hydrological Decade programme and its Co-ordinating Council, assisting in the implementation of projects for the Decade concerning basic data, water inventories, research, exchange of information and education and training; assisting member States in regional activities connected with the Decade;

(b) Promoting the general advancement of hydrology by executing hydrological studies, applying modern methodology and collecting, exchanging and documenting hydrological information; developing education and training in the field of water resources and assisting developing countries in the development of national hydrological programmes and in research and training;

(c) Assisting the development of water resources investigation, integrated programmes of national water resources research and environmental studies related to the programme known as "Man and the biosphere";

(d) Assisting member States in strengthening high-level technical education and in developing technological and research institutions related to water resources.

29. The World Health Organization. The World Health Organization is concerned with the human environment from the point of view of physical, chemical, biological and social processes and influences that directly or indirectly have a significant effect on the health and well-being of the human race, both individually and as a whole. Water is recognized not only as making a positive contribution to man's health and well-being in assisting him to create a clean and healthy environment and to achieve economic development but also as constituting a potential health hazard when acting as a vehicle for water-borne and water-related diseases and environmental degradation. The WHO programme includes:

(a) Direct assistance to Governments for (i) the appraisal of the sanitary quality of water; (ii) the establishment of more effective institutions and services; (iii) the planning and management of national programmes; (iv) the training of human resources; (v) pre-investment studies;

(b) Development and periodic review of internationally acceptable environmental quality criteria, guides and standards, as well as guidelines or "codes of practice" on the prevention and control of pollution, on waste disposal and on water-supply;

(c) Collection and assessment of date on environmental and sanitary conditions, including systems for sampling and analysing selected toxic and persistent chemical pollutants and microbiological agents in rivers and other natural water bodies used as sources of community water.

30. The International Bank for Reconstruction and Development, the International Development Association and the International Finance Corporation. These organizations play an important role in financing economic development, including projects in the field of water resources development.

31. The World Meteorological Organization. As indicated in the Convention of WMO, resolutions of its Congress and decisions of its Executive Committee, in pursuance of the request of the Economic and Social Council in its resolution 675 (XXV) and in accordance with the agreement reached in the Sub-Committee on Water Resources Development of the Administrative Committee on Co-ordination, the involvement of WMO in the field of water resources is mainly through its responsibilities in agrometeorology, hydrometeorology and hydrology. In this connexion, the World Weather Watch has a special role. In particular, WMO is responsible for:

(a) The operational aspects of the collection, transmission, processing and publication of hydrological data;

(b) Research into and development, improvement and promotion of methods used in the design of networks and the standardization of instruments and methods of observation, operational phases of hydrological forecasting and supply and meteorological and hydrological data for the design of projects.

32. The organization considers long-term efforts in the above fields of surface-water hydrology as its primary responsibility in the development of water resources, apart from all its activities in meteorology.

33. In the projects carried out within the framework of UNDP, WMO sees its role to be assistance to the creation and development of meteorological and hydrological services and related nation-wide networks of stations.

34. The International Atomic Energy Agency. In order to carry out its duties of promoting the peaceful utilization of nuclear energy and nuclear techniques, IAEA has, in connexion with water resources development, a programme of studies on the use of isotope technologies in hydrology, nuclear desalination and waste management. The Agency also provides assistance to its member States:

(a) In the use of isotopes in hydrology, by helping with research and providing technical assistance to developing countries, in the collection of environmental isotope data, in the dissemination of information on the use of nuclear techniques in hydrology and in applied studies for UNDP projects in co-operation with other United Nations organizations;

(b) In the use of nuclear energy for the development of water supplies, including the technical and economic evaluation of nuclear desalting projects, in the comparison of nuclear desalting with alternative water sources, in long-range planning and in nuclear desalting project development;

(c) With regard to the prevention and control of the pollution of water resources by radio-active materials.

Comments of organizations on the foregoing statements

35. As a result of interagency discussions within the Sub-Committee on Water Resources Development of the Administrative Committee on Co-ordination, there is now a large measure of agreement among members of the United Nations system regarding their respective responsibilities. There are, however, specific aspects of the spheres of competence of the various organizations, as outlined above, on which there is still some lack of agreement. The relevant views of the organizations are set forth in section 2 below. Additional comments of organizations on the matter will be issued in an annex under the symbol E/C.7/38/Add.2.

1. Areas of agreement

Co-ordination of operational responsibilities for UNDP-assisted projects (submitted by UNDP)

36. After consultation with the Government concerned, UNDP decides on the allocation of water resource projects. In making that decision, UNDP considers a number of factors, notably the availability of expertise, past experience with the execution of projects of the type in question and the "end-use principle" (according to which the organization most concerned with the end use of the water should be responsible for the whole project).

37. The instructions currently in force on country programming provide that, with the exception of on-going projects, the country programme document itself should not contain any reference to the proposed executing agency for individual project proposals tentatively identified in that document. However, at the same time as he submits the draft country programme the resident representative is asked to attach a covering letter indicating his opinion, after consultation with the Government, as to the most appropriate executing agency for each proposed project. The organizations, all of whom receive copies of the draft country programme, are requested to include in their comments their own views on the selection of the executing agency for specific projects. Upon receipt of the organizations' comments and after its own appraisal of the country programme, the relevant regional bureau of UNDP informs the resident representative, as part of its comments on the programme, which would be the most appropriate executing agency for each project proposal included. For country programmes that by last May were already in their final form, resident representatives were asked to follow similar procedures in identifying the executing agencies for the projects included in them.

38. The development of country programmes, involving a logical and timely sequence of projects and implementation on the basis of realistic appraisals of the country's needs and capabilities, may be expected to give rise to a need for more interagency consultations where sectoral programmes concern more than one agency. This has been true in the past of river-basin projects, some of which covered several riparian countries, where the co-ordination of projects assisgned to different executing agencies on the basis of the criteria mentioned above has usually been assured through ad hoc consultations and, when necessary, through the creation of a consultative committee. There are also cases where a project, although

assigned to one organization, must be implemented in association with other organizations. When such association is limited to specialized services, such as a few consultant man-months, no particular problem arises. The situation is more complex when other organizations have to be associated with the execution of a sizable part of the project. In such instances, a clear definition is needed of the administrative and operational implications of such an association on a case-by-case basis and this is generally provided for in each project document.

Evolving a common approach to water resources development

39. Inspired by the guidelines for action which had been prepared by the Committee on Natural Resources, 1/ the Sub-Committee on Water Resources Development of the Administrative Committee on Co-ordination attempted to define a common approach to water resources development as a foundation for improved interagency co-ordination. In a preliminary statement on co-ordination, the Sub-Committee based its approach on the definition given in the first paragraph of the basic principles of the guidelines, which state that "in the field of natural resources it is of particular importance to formulate an integrated approach, both short-term and long-term, to their development and utilization". 2/ The Sub-Committee made a good beginning towards defining these principles at its session in February 1972 and plans to return to the task at its next session. 3/

Water management, administration and law

40. The importance of water management, administration and law is recognized by all organizations, as many of them have a responsibility for the sectoral aspects of those subjects. Domestic and municipal water-supply requires adequate management, institutions and laws; the same applies to other water uses, for example, for agriculture, industry, hydropower, navigation, transportation and fish production, as well as to conservation activities and to the harmful effects and health aspects of water resources development.

41. Water resources development and conservation necessitate water policy decisions for the allocation of water to different uses and areas, and any sectoral aspects of water administration must be viewed within the framework of the over-all national water policy, administration and legal framework.

42. The organizations of the United Nations system recognize the role of the United Nations in the areas of management, administration, law and policy, regarding total water resources. However, it is agreed that close co-operative arrangements are needed between the United Nations and the interested organizations.

1/ See Official Records of the Economic and Social Council, Fifty-Second Session, Supplement No. 5, paras. 16-21.

2/ Ibid., p. 5, para. 1.

3/ It may be noted that the present report was completed before the recommendations of the United Nations Conference on the Human Environment were considered by the General Assembly.

The United Nations does not deal with sectoral aspects without consultation with the organizations concerned. It is agreed that the same procedure should apply when staff and experts from the other organizations have to advise Governments on aspects of general policy, law and administration. It is also agreed that there should be, as necessary, informal consultations between the concerned staff members and experts in the United Nations and in the other organizations for this purpose. The organizations recognize the importance of making the fullest use of the limited number of specialists in the field of water management, administration and law.

Activities in the field of hydrology

43. In January 1972, an ad hoc working group on hydrology of the Sub-Committee on Water Resources Development met at Geneva. Its aim was to review the role that various United Nations organizations, active in matters relating to water, might play in the long-term programme on hydrology (scheduled to continue beyond 1974) approved in 1971 by the Co-ordinating Council of the International Hydrological Decade.

44. After a general discussion of the philosophy of intergovernmental and interagency programmes in hydrology, the ways in which these could be co-ordinated and a review of the basic orientation of the programme, the organizations agreed to the following allocation of specific programme responsibilities among themselves:

(a) Establishment and operation of adequate measurement networks for water balance variables: primary responsibility with WMO;

(b) Improvement and development of network design and measurement instruments: primary responsibility with WMO, in close co-operation with UNESCO and United Nations regional economic commissions;

(c) Development and improvement of methods of computation for the elements of water balances, including groundwater, for short periods to facilitate computation of operational balances: primary responsibility with UNESCO, in close co-operation with WMO and United Nations regional economic commissions;

(d) Research into hydrological régimes and development of methods for computation of elements for water management design: programme to be implemented following direct discussions between UNESCO and WMO;

(e) Development of systems for the collection and processing of hydrological information using advanced technology: primary responsibility with WMO, in close co-operation with UNESCO, IAEA and the United Nations;

(f) Development of representative and experimental catchments, including applications of data derived from them especially for use in mathematical modelling: primary responsibility with UNESCO in close co-operation with WMO, FAO, WHO, United Nations and its regional economic commissions and IAEA;

(g) Compilation of longer term regional and global comprehensive water balances including study of multinational river basins: in view of the very broad nature of this topic, UNESCO might take the leadership, in collaboration with all other agencies;

(h) Investigation of the hydrological effects of man's activities and their assessment, using control data: primary responsibility with UNESCO, in close co-operation with WHO, FAO and United Nations;

(i) Quantitative and qualitative influence on the hydrological cycle of irrigation developments in arid areas and establishment of techniques and management: primary responsibility with FAO;

(j) Quantitative and qualitative effects on the hydrological cycle of urban and industrial development: programme to be implemented following direct discussions between UNESCO and WHO;

(k) Groundwater hydrology: major concern to the United Nations, UNESCO and FAO, with close co-operation of all other interested agencies.

45. Since the long-term programme was not all inclusive, each organization agreed to note the portions of the programme for which it should bear primary responsibility, with a view to including such activities in its programme of work. At the same time, the organizations also noted the primary responsibility of other organizations for other topics, with a view to avoiding duplication and overlap. Such inclusions in, or exclusions from, an agency programme would not prejudice or restrict the activities in hydrology being conducted by each organization within its own specific fields of competence. With a view to ensuring the co-ordination of activities in hydrology, both within the framework of the long-term programme and for activities being conducted outside the programme, it was reaffirmed that the Sub-Committee on Water Resources Development of the Administrative Committee on Co-ordination was the most appropriate forum for harmonizing the activities of the various organizations in this field.

46. As regards interagency collaboration on the long-term programme in hydrology adopted by the Co-ordinating Council of the International Hydrological Decade, the organizations unanimously agreed that the programme adopted by the Co-ordinating Council of the International Hydrological Decade should be regarded as an international co-operative programme of an interagency nature, with no single organization or body assuming over-all responsibility for the execution or supervision of the whole programme. It was understood that the General Conference of UNESCO would delineate its own programme in accordance with its specific competence and would take appropriate organizational measures for its execution. Co-ordination between agencies would be achieved through the Sub-Committee on Water Resources Development. Bilateral arrangements between secretariats designed to harmonize the implementation of their respective hydrological programmes should also be encouraged.

47. These arrangements were subsequently endorsed by the Sub-Committee on Water Resources Development and by the Administrative Committee on Co-ordination and have led to an agreement between UNESCO and WMO.

2. Problems of interagency co-operation

48. The areas of agreement have been treated in the present report in a rather concise manner and whenever possible they have been expressed in the language agreed to by the organizations. On the other hand, it has been found necessary to analyse in considerably greater detail the problems of interagency co-operation and the views of the organizations on these problems, in order to present a balanced picture of the situation in each case.

Question of "end-use principle"

49. Undoubtedly, the most difficult and tension-provoking problem with respect to water resources activities is the question of the allocation of groundwater survey projects. The United Nations, FAO and WHO each carry out groundwater survey projects and it is difficult to arrive at a mutually acceptable principle for their allocation.

50. In 1969, the Sub-Committee on Water Resources Development of the Administrative Committee on Co-ordination, after long discussions, reached what appeared at that time to be a consensus on this question:

> "Regarding groundwater, the principle of the main consideration of the 'end-use' was retained. The organization most concerned with the 'end use' of water should be responsible for the whole project. The Sub-Committee agreed that groundwater surveys are only one of the available means to determine the availability of water resources for certain uses; therefore, groundwater surveys should be designed and carried out with a view to development.
>
> "As it is impossible in this connexion to separate groundwater from the hydrological cycle, necessarily each represented organization will have an interest in groundwater as well as surface water, in hydrology in general, be it from scientific and operational aspects (UNESCO, WHO) or for development to meet certain demands such as for community water supply (WHO) or agriculture (FAO)."

51. The end-use approach means that FAO is made responsible for projects where water is to be used primarily for agricultural purposes and WHO where water is to be used primarily for domestic purposes. The agencies with sectoral responsibilities favour this approach.

52. The United Nations, on the other hand, feels that the end-use principle is static and now outmoded, in view of the expected shortages in water in the decades to come, for which the most efficient and productive use of water will increasingly be required. It continues to feel that the organization with the available expertise and the most comprehensive outlook on water problems in the natural resources context should be made responsible for the projects.

53. The specific attitudes of the various organizations towards this problem may be summed up as follows:

54. (a) United Nations. The difference of opinion on the application of the end-use principle has arisen in the United Nations family in the specific case of the exploration and development of underground water resources. If the principle is accepted, every organization in the United Nations family involved in any way with water would be able, as WHO does now, to claim the right to undertake projects in underground water exploration. This would result in many organizations employing geologists and hydrogeologists, a situation that is unknown at the governmental level, though there are some countries in which underground water is explored by the agricultural departments of the Governments which then necessarily also engage geologists. The United Nations maintains that, as far as possible the division of functions should be based on the avoidance of this kind of duplication of professionals. The end-use principle will, by necessity, lead to an increasing duplication of the work of groundwater geologists.

55. Groundwater exploration itself can no longer, in most countries, be undertaken as a separate activity because the modern development of water resources often requires a utilization of the seasonally surplus surface water through underground recharge and storage.

56. Moreover, the multipurpose character of the natural resources potential involved in groundwater (a factor recognized by the Committee on Natural Resources when it called in its guidelines for a multipurpose analysis of water) indicates that groundwater should be explored for all its potentials, that is to say, whether it is cold or hot, whether it is pure water or carries minerals of significant value, whether it is water which is to be pumped, or water which comes from shallow depths as artesian water or from very great depths by geopressure.

57. The exploration and development of groundwater from the over-all point of view of the Government's interest will avoid the many failures that have been noticed over the years because each water user has specific requirements for the water and cannot necessarily use the type of groundwater that has been found by exploration; thus, if groundwater is explored for irrigation, only shallow and cheap groundwater can be used; if the water is found at greater depths and needs pumping, it will be too expensive for irrigation. Similarly, water of a quality not usable for direct human consumption may be usable for many other purposes. A sectoral approach to the exploration of groundwater has grave limitations.

58. Thus, the United Nations feels that the principle of end use creates more difficulties than it solves. The application of this principle is particularly complex where water is concerned because the over-all shortage of that commodity is increasing and, with the concurrent increase of water pollution, reprocessing and re-use of the same water will occur many times. Given the need to achieve greater efficiency through a replacement of the once-through flow concept for water, it becomes increasingly difficult to determine in each case what the last or end use of a physical quantity of water actually will be.

59. The United Nations also points out that Governments are increasingly disassociating water resources development from sectoral ministries and assigning them to ministries of water and power (India) or public works departments (many African countries). The application of the end-use principle in the field of (ground) water surveys would, therefore, be inconsistent with the allocation of similar functions within many Governments.

60. The United Nations stresses further that more attention is being paid by Governments to the possibilities of long-distance conveyance of water and/or the creation of national or regional water grids. In the case of groundwater, withdrawals from specific areas or regions may affect water balances that are well beyond the immediate area of the specific project and, hence, the problem should be viewed in a regional or national context. The end-use principle seems to be in contradiction to a dynamic, integrated approach to water resources development, which is necessary if the growing demand levels envisaged in the next decades are to be properly met.

61. Finally, in the United Nations view, the end-use principle is not applicable to the water resources activities of IAEA, WMO and UNESCO.

62. (b) Food and Agriculture Organization of the United Nations. The term "main end-use principle" or "end-use principle" signifies the principle of the pragmatic allocation of UNDP field projects to the agency best suited to cover all the disciplines necessary for the multidisciplinary approach to attain the end purpose of the project. For example, a project dealing with water development for agriculture would be assigned to FAO under this principle, because FAO can provide expertise in complementary disciplines such as those of soil resources, agricultural inputs and infrastructure and the socio-economic aspects of rural development. Thus, the main end-use principle provides for the horizontal integration of interrelated disciplines at the project level. This is particularly important for groundwater projects, as the detailed study of underground aquifers and the development of large quantities of water needed for agriculture depend upon the development of the required agricultural infrastructure. By means of this approach, for example, an attempt is made to avoid costly studies of the capacity of underground aquifers in areas with poor soils which do not render irrigation development feasible. The main end-use principle also provides for a pragmatic approach to the allocation of UNDP field projects that involve different water uses, since there is generally one main purpose of a project, and one water use which requires the main input, whether the criterion be the quantity, quality or cost of the water. The Food and Agriculture Organization has the necessary links with other specialized agencies for their association, where necessary, in this type of multi-use project.

63. The main end-use principle should be distinguished from what FAO refers to as the "users' approach". Whereas the former accords with the agreement of the Administrative Committee on Co-ordination for a pragmatic project-level approach, the latter extends this integration vertically within the water field. As stated in the guidelines for action in the development of natural resources of the Committee on Natural Resources, "in order to grasp the full spectrum of options and

interdependence in the field of natural resources, it is of particular importance to formulate an integrated approach to their development and utilization". 4/ In this respect, FAO sees surface water and groundwater as one resource, their assessment and development as dependent on their use and the purpose and practice of their management as entirely use-oriented. By means of the users' approach an attempt is made to accomplish both horizontal and vertical integration within water disciplines and with related disciplines. The Food and Agriculture Organization is particularly suited to follow this approach as it can provide expertise for both aspects, covering water disciplines as well as agricultural disciplines, including the related fields of forestry, fisheries, economics and rural sociology.

64. (c) World Health Organization. The end-use concept has been accepted by all organizations concerned with the exception of the United Nations, as signifying that projects reflect the specific need of a Government at a specific time for a specific and often geographically limited use, whether it be for community water-supplies, rural water-supplies, sewerage systems or agricultural development. Specific health-related activities require that integrated advice be provided to Governments, covering the institutional, administrative and legal aspects as well as investigations of groundwater and surface water, where possible within the over-all resources policies of Governments.

65. A multidisciplinary, dynamic, integrated approach is used by the executing agency on any such projects, whether their aim is general or sectoral (for example, community water-supply) water resources development. For example, in the water-supply and sewerage projects for which it is executing agency, WHO encompasses the following components: comprehensive surveys of sources of water, however geographically limited the area of demand may be; the preparation of a phased master plan, with consideration for other demands for water resources utilization in that area; the preparation of preliminary engineering and feasibility studies for immediate needs; assistance in the establishment of institutional arrangements; advice on organization, methods of administration, review of and advice on the financing methods; assistance in the establishment of training programmes for operational and maintenance personnel; and the training of key members of government staff through fellowships. Close co-operation is established with other members of the United Nations system in carrying out this work through subcontracting and other arrangements, in order to provide the best possible assistance to Governments. In addition, WHO is fully cognizant of the need to assess waste water re-use in such a context and has, as an integral component in its sewerage projects and water pollution studies, the determination of alternative methods of waste water disposal and re-use and the effect such disposal or re-use may have on the environment and human health. Normally, WHO has found that a large number of ministries have authority and responsibilities in the field of water resources; for example, in one country there are nine agencies concerned with water resources.

4/ Official Records of the Economic and Social Council, Fifty-Second Session, Supplement No. 5, p. 5, para. 1.

66. From a practical viewpoint, groundwater studies required for specific purposes, such as a rural or community water-supply programme, need to be integrated as part of the total project programme. This is necessary in order to establish the specific quantity and quality (physical, chemical, bacteriological, etc.) needs according to the intended use. However, WHO recognizes the importance to Governments of general and over-all water resources studies which fall within United Nations responsibilities and in which WHO has in the past co-operated, and will continue to co-operate.

67. At the same time, it should be noted that studies undertaken for specific purposes, as, for example, for rural or community water-supply, usually depend on obtaining information on water availability within a very short time. General groundwater exploration is of a multipurpose nature and is often nation-wide. They require a long period of time and do not aim at satisfying specific, immediate existing and projected demands. In cases where projects are undertaken to meet such needs, it is indispensable that the study of the water available within a limited geographical area be undertaken as part of a project. Governments also proceed in this fashion; that is to say, on the one hand they undertake general groundwater resources surveys through specialized governmental bodies established for that purpose, while on the other hand they continue to cope with specific pressing problems of a limited geographical nature by utilizing the governmental agencies concerned with specific uses. The latter task is often performed by drawing on the expertise of the governmental agencies responsible for over-all groundwater resources development, but the survey of water availability for specific projects is part of the specific project itself.

68. (d) World Meteorological Organization. With regard to the end-use principle, it may be stated that the activities of WMO, including the establishment of networks of hydrological stations and the strengthening of hydrological services, are to the benefit of all main users of water.

Desalination

69. (a) United Nations. The United Nations believes that the water-supply situation should be evaluated in an integrated manner before decisions are taken regarding the most suitable source of water-supply. Desalination is one of a number of possible sources of supply and should be considered among the technical and economic alternatives reviewed. Desalination plants require energy, either in the form of heat usually supplied by a separate boiler or in the form of electricity; they have, therefore, a considerable energy input. The only exception is geothermal desalination where the water comes out of the ground more than hot enough for desalination, thus obviating the costs of energy. Most desalination plants are single purpose plants, though there are a number of dual purpose power desalination plants. All dual purpose desalination plants present difficulties for the following reasons:

(i) The demand for water and the demand for electricity do not coincide and this difficulty can only be overcome if a country has both a power grid and a water grid or, alternatively, if the country is willing to invest heavily in water storage facilities, so that the desalination plant could also operate at full capacity in winter when the demand for water declines;

(ii) Normally a new power station is put on base load and as the electricity system grows and expands it normally moves after 10 years from the base load to the medium load, being replaced in the base load by newer and bigger stations which have lower unit costs. A dual purpose plant must be kept on base load for its expected life, namely about 25 years, and this creates the so-called base load penalty which is an additional cost factor for a dual purpose plant of any type.

70. Numerous studies have been undertaken on the use of nuclear energy for desalination but none of the nuclear powered, dual purpose plants have as yet found to be economic and many of the projects such as those in California and Israel have been postponed. It is significant to note that a single purpose desalination plant using a reactor as a heat source would be even more uneconomic at the present stage than a dual purpose nuclear power and desalination plant. A possibility of duplication arises where an agency primarily concerned with the application of a given technology, which is an input into a production process, uses its jurisdiction in the specific technology to claim responsibility for the production process as a whole. Thus, while IAEA is undoubtedly the organization that has competence for projects involving the application of nuclear energy for purposes of desalination, the question arises in each case whether this or some other source of energy should be used for desalination projects; and regardless of the source of energy selected, the problem remains one of selection among water-supply alternatives, an area for which jurisdiction and competence lie with the United Nations at the international level.

71. (b) International Atomic Energy Agency. In carrying out its responsibilities to assist its member States in the practical application of atomic energy for peaceful purposes, IAEA has provided advice and assistance in nuclear reactor applications in response to requests from member States. Such assistance, because of nuclear and reactor cycle considerations, includes nuclear desalination. As in the case of nuclear power plants the advice of IAEA is based upon an evaluation of the nuclear alternative against more conventional possibilities.

72. With regard to the economic feasibility of nuclear-fuelled desalination plants, IAEA considers that, by combining the production of electric power and the desalting of water in a single, large dual purpose plant, economies can be obtained in relation to the individual production of either of these two vital commodities. During the past several years, progress has been made not only in improving the fundamental technology of both the nuclear energy source and of the water desalting processes but also in understanding the technical, economic and even administrative factors which affect the prospects for the application of large-scale nuclear desalting. Technical and economic feasibility studies on nuclear desalination application in developing countries are going on in Egypt, India, Mexico and Pakistan, and the results so far obtained are promising.

73. The Agency draws attention to the dual purpose, fast breeder reactor plant (with a capacity of 250 MW (e) and some 125,000 cubic metres of desalted water per day) that is being completed at Shevchenko in the Union of Soviet Socialist Republics. Of great practical importance are research and development studies in the United States of America on scaling up the desalting components to a size that can be used in conjunction with larger nuclear desalting plants (up to one thousand million gallons per day).

74. With regard to the selection among water-supply alternatives, IAEA considers that jurisdiction and competence lie exclusively with the authorities of the Government concerned and not with the United Nations, and that to fulfil its statutory obligations IAEA must be responsive to requests for assistance in nuclear desalination feasibility studies, just as it is responsive to requests for nuclear electricity generation feasibility studies, which it has carried out in numerous developing countries in co-operation with UNDP and the United Nations itself.

Water management, administration and law

75. Despite the understandings reached in the Sub-Committee on Water Resources Development and described in paragraphs 40-42 above, there are still some tensions between the United Nations and FAO regarding the implementation of these arrangements. Both organizations are active in this area: FAO deals with water legislation, management and administration at the national or multi-national level, viewing water as an input to agriculture, while the United Nations performs the same tasks from the point of view of maximizing the social and economic benefits to be dervied from all uses of water.

76. (a) United Nations. The United Nations feels that unless water resources and water rights are viewed in a national context, where management is divorced from ministries or organizations which favour specific user categories, it will be impossible to promote effective and economically meaningful water resources policies. Thus, where feasible, the United Nations promotes the creation of viable and action-oriented national water authorities as a way of overcoming the proliferation of authority among a number of competing and sometimes overlapping bureaus or ministries.

77. In countries with ample water resources, water problems can often be solved at a local level and governmental water management, administration and law are often not required to an extensive degree. However, where water shortages exist, priorities for water use have to be established on the basis of the national economic planning, and water law, water administration and water management become important. All have to be directed to the best use of water from the point of view of economic development and not, as in a famous case of a desert country without any rivers, to give priority for agricultural use. Water administration has hitherto been a neglected area, and for this reason the United Nations has, over the last few years, undertaken a detailed study of water administration in a number of countries, both developed and developing, including countries from Eastern as well as Western Europe. The reports are soon to be published and reveal a

considerable variety of water administration systems; a further proof that a wider international exchange of information in this important field is needed. With the need to place increasing emphasis on water quality and environmental protection, new tasks will have to be incorporated in existing water laws as well as in water administration and management. All these tasks must be performed at a governmental level, based on general decisions affecting the economy as well. There is reason, therefore, to discourage the development of water laws, water management and water administration based on a narrow sectoral approach which may fail to take into account water needs or use in other sectors.

78. (b) The Food and Agriculture Organization. The Organization points out that the modernization of water law and water administration is not an aim in itself but a means to achieve specific policy objectives, that are determined by the over-all priorities of national economic planning, and hence are functionally oriented towards, for example, agricultural development and ecological conservation. Owing also to the close interrelationship of the rights concerning water and land use in the social context of the rural environment, a functional approach is required whereby water law is integrated into general national development policies, rather than the creation of isolated legal-institutional structures for the water sector.

B. Activities in the fields of minerals and energy

79. The situation with regard to minerals and energy is quite different from that of water resources. Fewer organizations are involved, and the division of responsibilities is more clear cut. Furthermore, the activities that have to be carried out jointly, or at least in close co-operation, represent a much smaller proportion of the totality. It has, accordingly, never been felt necessary to establish special interagency machinery for the co-ordination of these activities, and the first interagency gathering to deal with them, as such, was the ad hoc meeting on natural resources convened in July 1972 to help with the preparation of the present report. The following material has been prepared in the light of the discussions at this meeting.

1. Areas of agreement

80. It has not been found necessary to delineate areas of agreement with regard to energy and minerals because the majority of the activities concerned have not, in the past, given rise to difficulties over the division of responsibilities. It was deemed better, therefore, to approach these activities from the standpoint of the specific problems that have begun to arise in recent years in certain aspects of these programmes.

81. One example of the type of understanding that does exist in these areas is provided by the current division of responsibilities with regard to energy surveys. Within the United Nations family, the United Nations carries out electricity and energy surveys which, as indicated in chapter I (E/C.7/38, section F), may also be undertaken by IBRD. On the other hand, surveys relating to the introduction or development of nuclear power and to specific nuclear power projects are carried out by IAEA, with assistance, as appropriate from the United Nations and IBRD.

2. Problems of interagency co-operation

82. There are a certain number of activities concerning minerals and energy for which organizations hold differing views on the distribution of responsibilities or which involve rather complex co-operation between them. These include:

(a) Multi-mineral versus mono-mineral exploration (United Nations/IAEA);

(b) The use of nuclear and conventional explosives for mineral production (United Nations/IAEA);

(c) Mineral processing (United Nations/UNIDO);

(d) Short-term, medium-term and long-term trends and prospects for minerals (United Nations/UNCTAD);

(e) Petroleum refineries (United Nations/UNIDO);

(f) Training (United Nations/UNESCO).

83. A separate section is devoted below to each of these activities. With regard to activities (c) and (e), it should be noted that the exact delineation of responsibilities between the United Nations Department of Economic and Social Affairs and UNIDO is the subject of current consultations.

Multi-mineral versus mono-mineral exploration

84. In its resolution 1550 (XLIX) on the division of responsibilities between the United Nations and IAEA for projects involving prospecting for nuclear metals, the Economic and Social Council reaffirmed the primary role of the United Nations in the conduct of multi-mineral or single-mineral surveys and recognized the special competence and responsibility of IAEA for the conduct of /mono-mineral/ surveys for nuclear metals as requested by Governments of Member States. This division of responsibilities reflects the relevant constitutional responsibilities of the United Nations and IAEA and has constituted the basis for various forms of co-operation between the two organizations at the working level. Thus, the United Nations and the Agency keep each other informed, as a matter of course, of matters of common interest that may arise from technical missions to Member States. In addition, members of the Resources and Transport Division of the United Nations Secretariat participate in such specialized meetings of IAEA as those on uranium geology and exploration methods and specialists in the Division are consulted by IAEA on such matters as drilling specifications for projects executed by the Agency. The two organizations, however, continue to hold differing views as to the relative value of multi-mineral and mono-mineral surveys. Their position on this issue is summarized below.

85. (a) United Nations. The United Nations considers that the interest of the developing countries would be better served by multi-mineral surveys and one single survey organization rather than by the duplication of geological services. In all mineral exploration, whether for single or multi-mineral purposes, the same principles, staff and equipment are needed for the geological mapping, photogeology, geochemical and geophysical methods, diamond drilling and the like and the greater the number of exploration tools and methods, the more costly modern exploration becomes. However, as confirmed by United Nations experience, modern tools increase the success ratio, particularly, if the exploration is designed to find all minerals of economic value in the area to be explored. The multi-mineral approach and the mono-mineral approach, using the same heavy equipment and specialists, produce the same results. This is confirmed, for example, by the discovery of nuclear material by the United Nations in a number of its projects and by the discovery of non-radioactive material by IAEA-executed exploration projects in one of the two countries in which mono-mineral exploration is being carried out.

86. Moreover, uranium and other radioactive materials are often found in combination with other minerals or as by-products; thus, the gold mines in South Africa have as a by-product the highest record uranium resources of any country. Uranium is also found in phosphates, in certain oil shales and so on. Consequently in most countries uranium exploration comes within the purview of the geological survey in charge of all mineral exploration. In any case, where the search for uranium at the governmental level is entrusted to atomic energy authorities, nearly all the work is

done by the private mining industry. Incidentally, it should be noted that the adequacy or inadequacy of uranium reserves is largely a matter of the price of uranium, which has currently reached a level below $6 a pound. As a result of the drop in the price of uranium, a uranium cartel has been formed by a number of countries in order to maintain the price, because of the over-supply at present on the market. This surplus has already led to the closing down of some uranium mines. As to the long-term prospects, opinions differ, but even if there are no further discoveries (which is extremely unlikely) and uranium prices rise to a somewhat higher level and known high-cost reserves are thereby brought into operation, no shortages of uranium are to be expected.

87. In the United Nations view, one of the most serious consequences of the development of mono-mineral explorations is that they sometimes lead to the establishment of separate exploration services, attached to the national atomic energy authorities, with consequent duplication of geological services at the national level.

88. Economic and Social Council resolution 1550 (XLIX), adopted before the first session of the Committee on Natural Resources, confirmed the existing situation. It "reaffirms the primary role and responsibility of the United Nations for the conduct, at the request of the Governments of Member States, of multi-mineral or single mineral surveys". It also authorizes IAEA to undertake mono-mineral surveys for nuclear metals. Finally, it "requests the Secretary-General of the United Nations and the Director-General of the Agency to consult together in order to avoid any duplication between their respective organizations, to foster co-operation in survey programming, and to report to the Council as appropriate". The difficulty in this last paragraph is that if an organization is to be competent in mineral exploration, it must necessarily engage the great variety of specialists already employed by the United Nations (geologists, geophysicists, geochemists, drilling engineers and others) and therefore, if the two agencies are allowed to undertake mineral exploration, the duplication of professional personnel becomes unavoidable. The Committee on Natural Resources might wish to consider whether this situation constitutes an optimum use of the very limited professional resources in this area.

89. (b) International Atomic Energy Agency. The Agency recalls that the Economic and Social Council has considered this matter, and in adopting resolution 1550 (XLIX) on the division of responsibilities between the United Nations and the International Atomic Energy Agency, has recognized the special competence and responsibility of IAEA to conduct surveys for nuclear metals as requested by Governments of member States. By this resolution it established guidelines for projects involving prospecting for nuclear metals. The Agency accepts these guidelines and does not understand why the United Nations now seeks to re-open the matter.

90. Both multi-mineral and mono-mineral surveys have their place in mineral exploration, as the Council has recognized.

91. In looking for metallic minerals, the major mining companies and organizations in the world follow the mono-mineral approach in nearly all their work, once the basic geology is known; examples are exploration for copper in Zambia, nickel in Manitoba, Canada and uranium conglomerates at Elliot Lake, Canada.

92. The technical reason for preferring the mono-mineral approach for uranium is that this metal is usually found in areas in which other metals are not present in economically recoverable quantities. This is due to the unique geology of uranium. The only important exception is the South African deposit where uranium is associated with gold.

93. The present published world reserves of over 1 million tons of uranium have been almost entirely discovered by the selective mono-mineral survey approach or a variant thereof. In the United States of America over 200,000 tons of uranium have been discovered by private enterprises specifically searching for uranium, with support from the Division of Raw Materials of the United States Atomic Energy Commission. Similar patterns have emerged in Australia and Canada and comparable quantities of uranium have been discovered. In France 45,000 tons of uranium have been discovered as a result of mono-mineral surveys by the raw materials branch of the French Atomic Energy Commissariat (CEA). That body working entirely on a mono-mineral basis has discovered major reserves in the Niger (26,000 tons) and Gabon (13,500 tons). Similarly, the world's main medium-sized reserves have been discovered by the mono-mineral approach carried out by specialized geological divisions of national atomic energy organizations (Spain, 11,000 tons; Argentina, 10,000 tons and Portugal, 9,000 tons).

94. Practically no significant reserves of uranium have been discovered by the use of a general or multi-mineral approach. The uranium discovered in Somalia, although much publicized, has yet to be proved economically recoverable.

95. As indicated above, present low-cost uranium reserves are about 1 million tons. To meet the world's electric power requirements, in which nuclear energy is playing a rapidly growing part, about 2.5 million tons must be discovered and established in the next 30 years. The peak demand may be in about 1990 and, in view of the lead times involved, the period available for exploration and development is exceptionally short.

96. It is of course entirely a question of national responsibility whether to entrust this search to the national atomic energy authority or to a department of an existing mineral survey organization. As indicated above, most countries, both industrialized and developing, have chosen the first alternative and this choice has proved to be most effective. The countries that have entrusted the search, at the governmental level, partially or wholly, to the atomic energy authority include Argentina, Australia, Bolivia, Brazil, Canada, Colombia, Denmark, Egypt, France, Greece, India, Italy, Mexico, Pakistan, Peru, Portugal, South Africa, Spain, Sweden, many of the centrally planned economies, the United States of America, and many others. It should be stressed that in some of these countries, particularly Canada and Australia, by far the bulk of prospection is done by private mining companies using, as a rule, mono-mineral surveys.

97. The International Atomic Energy Agency has the responsibility to its member States to assist them in meeting the coming energy crisis within the time-limits that will be set by rising demand. It has and will continue a vigorous programme of providing specialized advice and support whenever requested to do so by member States. Thus, despite the slack market in the period 1959-1971, 65 experts were provided to 29 countries and more than 150 fellowships were awarded. Numerous

scientific symposia have been held. In co-operation with the Organization for Economic Co-operation and Development, IAEA keeps the world situtation with regard to uranium reserves, production capacity and demand under continuing review. In Greece and Pakistan IAEA is executing large UNDP projects for uranium exploration and development. The Agency works with whatever counterpart organization has been designated by the Government concerned. As indicated, in most cases this is a specialized branch in the national atomic energy authority. The Agency does not promote any duplication of services in the developing countries but co-operates with the service designated by the interested Government.

98. With regard to the cost of multi-mineral and mono-mineral surveys IAEA concludes that:

(i) When the general geological background is established, it is more efficient to become selective and to operate mono-mineral surveys; 5/

(ii) Detailed multi-mineral assessment would be far more costly than selective and individual mono-mineral surveys.

Use of nuclear and conventional explosives for mineral production

99. The use of peaceful nuclear devices for mineral production is a subject in which both the United Nations and IAEA are vitally interested - the former from the viewpoint of exploiting certain marginal or subeconomic ores (principally low-grade, large-tonnage porphyry copper/molybdenum mineralization at depth, which is uneconomic to mine by orthodox methods), the latter because of the nuclear technology involved and factors related to it.

100. In brief, the underground fracturing of large volumes of ore by nuclear devices (or conventional explosives) and subsequent leaching of the mass for copper or other minerals constitutes an in situ mining process which could find economic application in certain situations in view of relatively favourable production costs and environmental considerations. It would naturally be difficult to use this technique in heavily populated or built-up areas but it could be utilized in sparsely inhabited areas where the accompanying seismic effects of detonation would not be harmful.

101. (a) International Atomic Energy Agency. Pursuant, inter alia, to various resolutions of the General Assembly and to the provisions of the Treaty on the Non-Proliferation of Nuclear Weapons, IAEA is developing an international service for peaceful nuclear explosion projects, including arrangements for appropriate international observation. Such a service might eventually comprise feasibility studies, safety assessments and project arrangements, including arrangements to ensure that there is no transmission of significant nuclear explosive technology from the country providing the device to any other party. The services of IAEA

5/ In this connexion, see also the report of the Secretary-General on contributions of nuclear technology to the economic and scientific advancement of the developing countries (A/7568, in particular paras. 71, 80-82 and 95-96).

would relate to peaceful nuclear explosive projects carried out for any purpose (mining, civil engineering, recovery of natural gas, underground storage facilities, fire control and so on).

102. The technology is still at an experimental stage and some problems, including environmental ones, have to be solved before it emerges from the research and development phase. From the standpoint of radiation safety, the post-explosive development of deposits (ore, gas and the like) cannot be separated from the initial stages of the project (that is, the use of nuclear explosive technology), which will be the direct responsibility of the State providing the nuclear device, the State using it and IAEA as the international organization responsible for international observation. Hence, even in the later stages of the project close co-operation might be needed between IAEA and the Government concerned to ensure the radiation safety of post-explosive operations.

103. (b) United Nations. The United Nations recognizes the special role and tasks of IAEA as regards the technical aspects of nuclear explosives and the related safety problems. However, it does not believe that IAEA should be the agency to decide whether conventional explosives or nuclear explosives should be employed nor that IAEA should enter the whole field of the development of a mineral deposit or an energy deposit or any other natural resource that has been opened up in this way. The United Nations has, for this reason, brought the problem forward in order that the Committee on Natural Resources may realize in good time the possibility of duplication developing in the future; what is necessary at this stage is an understanding that the involvement of IAEA will be limited to nuclear explosives and the related safety aspects.

Mineral processing

104. Of the series of steps involved in the production of valuable materials from mineral deposits, some come within the purview of the United Nations (Department of Economic and Social Affairs) while others are the responsibility of UNIDO. These steps range from geological survey and exploration to the final production of machinery, building materials and so on, used by the consumer. The main disagreement concerns the stage in the mineral and metallurgical processing activities when responsibility should pass from the United Nations to UNIDO.

105. (a) United Nations. The United Nations has adhered to the guidelines indicated in previous official papers to the effect that mineral development activities come within its sphere of competence, while metal manufacturing processes are properly a UNIDO responsibility. Although, in a number of cases, UNIDO activities have extended to matters such as economic geology, feasibility studies of ore deposits and mineral economics, the chief activity about which clarification is needed is mineral processing, including concentration and extraction methods.

106. Mineral processing - the stage following the mining of the minerals - has been handled for many years by the Resources and Transport Division of the Department of Economic and Social Affairs, with UNIDO assuming responsibility when products are passed on for manufacturing processes. This is an orthodox division; the mining industry, for example, would consider it illogical for mining and mineral

processing to be considered as two separate entities. Even at the detailed exploration stage, mining and processing considerations are so interlinked as to be inseparable in the economic equation and this bond becomes stronger at the mine development and production stage. The Resources and Transport Division has been entrusted with the execution of a number of UNDP special fund projects where the two are interlinked; the survey of lead and zinc mining and smelting in Burma, the mining and metallurgical research institute in Bolivia, and the off-shore exploration for tin and tin ore dressing research in Indonesia are examples of this. Even in certain mineral exploration projects, such as the mineral exploration project in two areas in Turkey, the project team includes an ore processing engineer. It is considered, therefore, that no doubt should exist as to where responsibility lies for those sectors which are so closely linked with the mining process, for example ore concentration or beneficiation and metallurgical extraction by hydrometallurgy, pyro-metallurgy and electrolytic processes. Seminars and working group studies organized by the Resources and Transport Division are concentrating on these sectors, in view of the important role which will be played by in situ mining, involving leaching for example, in the future development of low-grade ores. In these cases, hydrometallurgy becomes, in fact, part of the mining process.

107. The United Nations accepts that in some cases ore processing may be more closely tied to the manufacturing sector and it may then be beneficial for it to be handled by UNIDO. The association between ore processing and manufacturing suggests itself as the logical basis for the determination of areas of responsibility. It may be remarked in this context, however, that such an as association of processing with manufacturing is more characteristic of the industrialized countries, many of which depend on imported ores and concentrates to sustain their manufacturing industries. In most developing countries, mineral processing - including extraction - is more commonly a part of the mineral development sector, since it is the step following mining operations and since the work is located in proximity to those operations, prior to the shipment of concentrate or metal to refineries and manufacturers, who are mostly located in the industrialized countries.

108. (b) United Nations Industrial Development Organization. It is obvious that there is a lack of proper delineation of roles as evidenced by the work programmes of the Resources and Transport Division of the Department of Economic and Social Affairs and UNIDO. Basically, the area of competence of the Resources and Transport Division should be geological surveying, prospecting and mining, while UNIDO should properly cover all metallurgical operations. By metallurgical operations, it is understood, in agreement with common and universal consensus, the winning of metals from their ores and their refining and further processing by metallurgical operations - such as rolling, forging and casting. The work programme of UNIDO gives a number of examples of metallurgical operations being carried out at the request of Governments and/or the Industrial Development Board. Moreover, in most countries metallurgical operations generally belong to the ministries concerned with industry.

109. Accordingly, UNIDO recommends that all activities (geological, surveying, exploration, mining and the like), that precede any form of processing, should be

the responsibility of the Resources and Transport Division, whereas the other activities mentioned above should fall within the domain of UNIDO. Such an a allocation of work would, among its other advantages, permit UNIDO to design an integrated industrial development programme in any developing country that might be interested in utilizing its available natural resources.

Short-term, medium-term and long-term trends and prospects for minerals

110. The United Nations Conference on Trade and Development considers that it would be appropriate that its competence in the field of studies of world market trends and prospects for minerals should be fully taken into account in any intensification of the work of the United Nations system in this area.

111. The Department of Economic and Social Affairs considers that the thrust of the work of UNCTAD is quite properly restricted to minerals in international trade. Consequently, the Department of Economic and Social Affairs should deal with the demand and supply of minerals which normally do not enter international trade, as well as with long-term projections of mineral resources from the point of view of the ultimate availability of resources for man's needs.

112. It is agreed that, while this is not a major problem at the present time, it does call for some clarification and periodic consultations between the two units concerned, so that the risks of duplication may be kept to a minimum.

113. Co-operative arrangements also exist for studies on the economic implications of the production of minerals from the area of the sea-bed beyond the limits of national jurisdiction.

Petroleum refineries.

114. (a) United Nations. In regard to the processing activity, there are a number of valid technical, economic, institutional and structural criteria, by which an attempt can be made to delineate the division between energy development and industrial production and which are therefore pertinent to the traditional division of responsibility between the Resources and Transport Division and UNIDO. First, when a primary product reaches a stage where the application of secondary processes does not result in a substantial change in the physical form and chemical composition of the original product, that stage may be logically included in the energy category. In the case of petroleum for example, the crude oil is "refined" but remains oil; when, however, the oil itself is used as feedstock in the petro-chemical industry, it undergoes substantial transformation. It becomes then the responsibility of UNIDO.

115. Similarly, when the energy production is accompanied by the production of non-energy products, it is natural to bring in UNIDO, as was done in a special fund project concerning natural gas in Algeria. A second criterion is to be found in the practical links between the different stages. The processes for the refining of crude oil, for example, are dependent on the characteristics of the crude, and the evaluation of an oil development project or a study analysing the techno-economic feasibility of an oil project must take into account the processing and marketing

aspects as well. It is for this practical reason that the work of the Resources and Transport Division, which has built up expertise and competence in this area over the years, has included a number of technical co-operation projects concerned with the refining and marketing aspects, along with assistance in the exploration and production of petroleum.

116. It should thus be taken into account that more than 80 per cent of the end products of a refinery are energy products, such as gasoline, fuel oil, kerosene or diesel oil, that are used by the energy-using sectors of the economy and that have to be handled together with other energy alternatives and questions, as is done by the Resources and Transport Division. This is a further reason why the Resources and Transport Division has been dealing not only with the exploration and transport of crude oil but also with the refining of crude oil and the subsequent distribution of energy products. It should also be noted that such a standard is applied by the oil companies, by national oil organizations and other bodies concerned.

117. (b) The United Nations Industrial Development Organization. The terms of reference of UNIDO include industrial processing regardless of the degree of transformation involved. There can be little doubt that petroleum refining is an industrial process. Furthermore, the result of the process is indeed a very substantial transformation of the raw material (crude oil) into a variety of marketable products. In many cases, the refining is closely related to the utilization of some of its end products in the petro-chemical industry.

118. In the view of UNIDO, the division of responsibility in the area of petroleum could be properly delineated by applying the same criteria indicated for the extractive industry as a whole. All activities related to mining proper, that is to say, geological studies, mineral surveys, exploration, extraction and the like, should be the responsibility of the Resources and Transport Division of the Department of Economic and Social Affairs, whereas activities involving industrial processing of the product should come within the competence of UNIDO. The rational allocation of work along these lines would enhance the effectiveness of both organizations in providing specialized services to the developing countries within their proper spheres of competence.

Training

119. There is full agreement that UNESCO will deal with scientific and technological education in general and with earth sciences and technological training at the undergraduate level in particular. The differences of opinion between the United Nations and UNESCO are limited to certain aspects of post-graduate training, and the two organizations are seeking to work out an agreement on this matter. Their views are as follows:

120. (a) United Nations. The division of responsibility between the Resources and Transport Division of the Department of Economic and Social Affairs and UNESCO is basically one in which the former handles practical development and associated aspects and the latter is engaged in scientific training and research. Certain

points of contact are of course desirable, and assistance is rendered, as, for example, to the international geological correlation programme of UNESCO. It is inevitable that operational activities sometimes overlap in those areas of training where an educational institution is the national co-ordinating agency concerned, but where specialized training with heavy emphasis on applied research and/or practical field training is required by the Government concerned. The United Nations Development Programme and developing countries have not unnaturally considered that where specialized training - as compared with fundamental training in the basic sciences - is required, particularly at the post-graduate level, it should be entrusted to the agency with the most experience and backstopping capacity in the field. This is applicable not only in the case of mineral resources development and energy and the techniques employed therein, but also in other fields. This concept has already been endorsed by UNESCO in its draft programme and budget for 1973-1974, in which the Director-General, in discussing the natural sciences, defined the role of UNESCO as "to foster and to serve the organization and advancement of the intellectual and social phenomenon of science in its most fundamental and most general aspects, stopping in any particular branch at the point where specialization, for which other institutions and agencies are responsible, begins". 6/

121. The approach of the United Nations is to incorporate practical field training aspects as an integral part of its operational projects. The various interregional seminars on the development and utilization of mineral and energy resources, which involve all developing regions and are arranged as appropriate in co-operation with the regional economic commissions, facilitate the exchange of information and experience in the technical, administrative, legal and institutional aspects of those resources. They thus serve, inter alia, an orientation and training function for policy-makers and technical and operating personnel, particularly in the developing countries. It is recognized that the ILO is also involved in training and that UNESCO could concentrate on high-level basic professional education which would, of course, include academic training. The ILO on the other hand could concentrate on projects for practical training in technical schools for middle-level technicians which often involve training in several technical disciplines.

122. (b) United Nations Educational, Scientific and Cultural Organization. Particular emphasis will be placed on training activities in the earth sciences through post-graduate courses, regional seminars and specialized fellowships. Training courses in mineral prospecting in developing countries, geothermal energy, engineering geology and applied micropaleontology will continue to be organized. Here also, assistance will be given through the regular programme of UNDP for the strengthening of the institutional capacity of Member States to meet their own needs for survey, research and training in the earth sciences and related studies of natural hazards.

6/ United Nations Educational, Scientific and Cultural Organization, Draft Programme and Budget for 1973-1974 (UNESCO, Paris, 1972), Introduction, pp. XI-XII, para. 23.

123. Training of specialists will be continued at UNESCO-sponsored courses for integrated surveys (Enschede, Netherlands), the study and management of natural environment (Paris-Montpellier-Toulouse, France), pedology and soil cartography (Ghent, Belgium), soil science and plant biology (Seville and Granada, Spain), applied geomorphology and natural resources research (Sheffield, United Kingdom). New post-graduate training courses in integrated surveys of natural resources and tropical ecology are to be established in developing countries.

Annex I

ADDITIONAL GENERAL STATEMENTS BY INDIVIDUAL ORGANIZATIONS

A. United Nations

1. According to the point of view and the approach of those concerned, the spheres of competence and work programmes set out in chapter I of the present document (E/C.7/38) may or may not represent a rational division of responsibilities. For the same reasons, and particularly because of institutional structures and rigidities, it may be most difficult to reach agreed views on "the most rational" division. In any case, it is regarded as healthy that, apparently for the first time, there is to be a serious airing of these matters at the intergovernmental level.

2. It is unfortunately difficult to quantify and compare claims of competence and achievements, some of which may be represented by a small technical assistance mission or study by an outside consultant and others by massive programmes of large-scale projects backed by corps of specialists. From the most recent report of the Administrative Committee on Co-ordination on expenditures of the United Nations system (E.5153), it may however be noted that under the activity heading "Natural resources" it is stated that the United Nations itself accounted for $33.1 million out of $43.8 million in 1970, $32.6 million out of $46.6 million in 1971 and $35.2 million out of $50.5 million in estimates for 1972 (see also E/C.7/38, annex).

3. It must be taken into account that problems of co-operation and division of responsibilities largely stem from the fact that the programme carried out by each organization is authorized by its autonomous legislative body and from the fact that the related agencies also enjoy a financial autonomy. There is thus a perhaps inevitable tendency for most organizations to widen their areas of activity and to view problems mainly in the light of their own particular subject interests, particularly when their activities are focused on a particular sector such as agriculture, health or industrial development.

4. With the increasing concern over natural resources, demonstrated by the very establishment of the Committee on Natural Resources, there is however reason to look at mineral, water and energy resources from the "resource" point of view in a concentrated fashion, with emphasis on global "development" as specified in Economic and Social Council resolution 1673 (LII). This approach corresponds to the complementary responsibilities of the Resources and Transport Division at the Headquarters level and of the regional economic commissions at the regional level. To all other organizations the problems of developing these resources are either marginal or approached from a particular or specialized point of view, as inputs for agricultural production or manufacturing, trade, health or science. There may be a tendency to branch out from the specialized into broader aspects, which nevertheless are likely to remain subordinate to the main function of the organization concerned, thus leading to a less than optimum use of scarce resources

and to interorganizational difficulties. The previous chapter offers examples, such as the placing of water management and water allocation with agricultural interests, or health interests leading to projects in groundwater exploration. It should be pointed out that the foregoing tendency is not a phenomenon unique to the United Nations system of organizations, but also occurs and creates similar difficulties at the national level.

5. In conclusion, given the situation at the national level and the structure and functioning of the United Nations system, it appears that a clear-cut division of responsibilities in the field of natural resources may be very difficult to achieve. At the same time, it is easy to exaggerate problems of duplication and waste. In any case, what counts is not the drawing of neat charts on paper but behaviour in practice. A satisfactory situation may be obtained by better co-ordination at the inter-secretariat level, provided only that the necessary means are made availalbe for practical co-operation and exchanges at the working level, reinforced by adequate co-ordination at the national level, as reflected in the decisions of governing bodies.

6. Finally, since operational and non-operational activities are to a large extent an integral part of one another, it appears appropriate that effective co-ordination arrangements should cover both activities.

B. Food and Agriculture Organization of the United Nations

7. Natural resources, their development, use and conservation have an important role in the advancement of agriculture, forestry and fisheries and the betterment of the living conditions of the rural population. The Food and Agriculture Organization is competent to deal with all aspects of natural resources development for agriculture and particularly with water development and management for rural areas, and with the conservation of natural resources, as they are influenced by agriculture and forestry. The Organization applies an integrated and multi-disciplinary approach towards natural resources, their development, utilization and conservation.

8. The Organization recognizes the need for interagency co-ordination of work on water resources and believes that such co-ordination should be based on:

(a) The adherence to and mutual recognition of the constitutional mandates of the organizations;

(b) The acceptance of common principles and a common approach to water development on the part of the organizations concerned.

9. In adherence to Economic and Social Council resolution 1033 D (XXXVII), which designated the Sub-Committee on Water Resources Development of the Administrative Committee on Co-ordination as the focal point of interagency co-ordination in the field of water, the Food and Agriculture Organization follows the agreements and principles which have been worked out by that Sub-Committee and have been reported above.

10. The Food and Agriculture Organization also recognizes the need for interagency co-operation in order to consider alternative uses for water resources. For this purpose the work of the Sub-Committee on Water Resources Development should be strengthened and bilateral or multilateral working arrangements between agencies should be extended, so as to create necessary links between agencies in the water field. In this connexion, it is significant to note that IBRD reported its satisfaction with the work of its joint divisions or arrangements for co-operative programmes with main development agencies, such as UNESCO, FAO, WHO and recently UNIDO.

11. In order to improve the work of the Sub-Committee on Water Resources Development, its secretariat should be independent from any single organization that has a major interest in water resources. The Sub-Committee should continue to solve co-ordination problems on an ad hoc basis through working groups. The example of the ad hoc working group on hydrology showed that such a method would lead not only to a clearer division of functions but also to an improved programme of co-operation in the particular field.

12. The Food and Agriculture Organization has already reported on its joint programmes and joint divisions with other agencies. It is felt that this type of working arrangement is the most effective one for interagency co-operation. However, it should be noted that the constantly tightening budgetary limitations, especially the curtailment of travel funds, have already led to a noticeable reduction of the capacity of FAO to contribute to interagency work.

C. United Nations Educational, Scientific and Cultural Organization

13. The role of UNESCO in the field of natural resources follows from its general mandate in education and science and from the history of its past and present activities.

14. It is in those areas where objective difficulties exist, such as in the area of water resources, that co-ordination efforts over the last few years have made real progress which should be fully taken into account. The Organization believes that the agreement reached within the Sub-Committee on Water Resources Development on matters concerning areas of competence and co-ordination policies should, in fact, be considered as representing the consolidated position of United Nations organizations on the most rational division of responsibilities between them.

15. The general orientation of the activities of UNESCO in the fields under review is towards an integration of various disciplines and of various activities with the broad objectives of the Organization. With this general orientation as a background, the activities of UNESCO come under two major headings: scientific and technological research, on the one hand, and education and training on the other. These activities constitute therefore an important but indirect element in the process of the development of natural resources as part of general economic development.

16. As regards scientific and technological research, it should be stressed that the UNESCO programmes are and have always been preferably oriented towards practical goals that could serve economic and social development, and are not confined to so-called "theoretical" or "academic" research. At the same time, the activities of UNESCO in research normally cease where a high degree of specialization makes it more appropriate for other existing organizations to promote them. This principle may lead to some "grey areas" in certain aspects of applied research. Such cases would normally involve only one other organization, and resulting interagency problems should be, and indeed usually are, solved by mutual co-operation.

17. As regards education and training, it should also be stressed that the UNESCO activities are and have always been oriented towards the building up of qualified professional and technical manpower in member States. This particularly applies to the graduate and post-graduate training of hydrologists, geologists and engineers of various specializations. While UNESCO has an over-all responsibility for a balanced approach to the training of different kinds of specialists and technicians, its activities in the above-mentioned fields are normally confined within research and training institutions and UNESCO is not directly concerned with on-the-job training within enterprises or government departments.

18. Finally, it should be stressed that one of the major objectives of UNESCO in general, and in the natural resources field in particular, is to help developing countries to build up their own facilities and capability for studies, research, education and training. The strengthening or establishment of national or subregional institutions for these purposes is therefore an essential responsibility of the Organization.

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CO-ORDINATION OF THE WORK OF THE UNITED NATIONS SYSTEM IN THE NATURAL RESOURCES FIELD AND PROGRESS IN THE IMPLEMENTATION BY THE UNITED NATIONS SYSTEM OF THE GUIDELINES FOR ACTION IN THE DEVELOPMENT OF NATURAL RESOURCES

Work programmes, spheres of competence, division of responsibilities and co-ordination measures

Report of the Secretary-General

II. AREAS OF AGREEMENT AND PROBLEMS OF INTERAGENCY CO-OPERATION

Annex II

ADDITIONAL COMMENTS OF ORGANIZATIONS ON THEIR DIVISION OF RESPONSIBILITIES IN THE FIELD OF WATER

1. The following annex contains the comments of the Food and Agriculture Organization of the United Nations (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations including the United Nations Industrial Development Organization (UNIDO) on the statements of responsibilities in the field of water which appear in chapter II, paragraphs 9-34, of the present report (E/C.7/38/Add.1).

2. These comments should be read in conjunction with section A.2 of that chapter, which contains a description of problems of interagency co-operation in the field of water and the views thereon of individual organizations.

The Food and Agriculture Organization of the United Nations

3. The Food and Agriculture Organization is not in agreement with certain aspects of the United Nations statement of responsibilities on the following grounds. A

large measure of agreement regarding the division of responsibilities of the different members of the United Nations system was reached as a result of interagency consultations and discussion in the Sub-Committee on Water Resources Development of the Administrative Committee on Co-ordination (ACC). The results of the 1969 session of the Sub-Committee, mainly devoted to these matters, were generally endorsed by the Administration Committee on Co-ordination. The United Nations submission in the present report deviates, in several respects, from the statement of responsibilities that the United Nations submitted to the Sub-Committee and this militates against interagency co-ordination in a complex area.

The United Nations Educational, Scientific and Cultural Organization

4. The United Nations Educational, Scientific and Cultural Organization cannot agree that the exploration of groundwater resources and general water resources surveys rest solely in the hands of the Resources and Transport Division of the United Nations Secretariat; it follows that projects financed by the United Nations Development Programme in this field are also more flexible in terms of execution. The organization also feels that the functions of the United Nations Water Resources Development Centre, articulated in 1964, have been overtaken by events, and are now obsolete in view of the progress made through the activities of the ACC Sub-Committee on Water Resources Development.

United Nations

5. The statement of United Nations functions and responsibilities in the field of water resources, contained in chapter II, paragraphs 10 and 11, of the present report (E/C.7/38/Add.1), is reproduced from the Triennial Report on Water Resources Development, 1968-1970, 1/ cleared with all the organizations concerned in manuscript form. This document constitutes the latest and most up-to-date United Nations publication embodying the functions and responsibilities of the various United Nations organizations dealing with water resources development. It is, in fact, more comprehensive than the statements made by the representatives of the organizations attending the meeting at the 1969 session of the ACC Sub-Committee on Water Resources Development, which did not include the views of some unrepresented agencies and regional commissions. As regards the "end-use principle", referred to as a guiding criterion for the allocation of field projects in groundwater, the position of the United Nations is to be found in document E/C.7/38/Add.1, paragraphs 54-61.

6. As far as general institutional aspects (economics, administration and legislation) are concerned, and irrespective of the functions attributed to the Water Resources Development Centre in this regard, the specific activities of other organizations can be an important input whenever emphasis has to be placed on sectoral considerations within an over-all framework.

1/ United Nations publication, Sales No. E.71.II.A.15.

7. The Resources and Transport Division exercises the functions of the United Nations Water Resources Development Centre in pursuance of Economic and Social Council resolution 1033 D (XXXVII) which specifically endorsed the terms of reference of the Centre, as contained in document E/3894/Rev.1. According to these terms of reference, which are reproduced verbatim in chapter II, paragraph 11 of the present report (E/C.7/38/Add.1), the servicing of the ACC Sub-Committee is only one of the functions of the Centre.

8. It should also be added that some agencies have provided information on their work programmes and spheres of competence in such general terms that it is difficult to delineate clearly areas of responsibility and overlap.

9. Finally, in the statement of its sphere of competence contained in chapter II, UNIDO refers to "programmes" including water requirements of industry, and the re-cycling and re-use of water. It may be noted that in its work programme, outlined in chapter I, UNIDO makes no reference to water. On the other hand, the United Nations, through its Department of Economic and Social Affairs, has been dealing with these topics for many years and has included them in its current work programme. Thus, any work programme that UNIDO might introduce in this area would clearly represent duplication.

* * *

10. The United Nations Industrial Development Organization states that it is unable to agree with the foregoing statement that any work programme that UNIDO might introduce in the field of the water requirements of industry would represent duplication. The activities and programmes of UNIDO, undertaken at the request of Governments and the Industrial Development Board, include the water requirements of industry as an integral part of its work in the planning of industrial projects and the efficient use of industrial inputs, including water, in the process of industrial operations. It is a continuing process and UNIDO is required to give its attention to the important water resource requirements for industrial purposes including its implications for environmental purposes.

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Work programmes, spheres of competence, division of responsibilities and co-ordination measures

Report of the Secretary-General

Addendum

III. MEASURES TO CO-ORDINATE THE PROGRAMMES OF THE ORGANIZATIONS AND AGENCIES OF THE UNITED NATIONS SYSTEM

Introduction

1. The Economic and Social Council, in paragraph 2 of its resolution 1673 C (LII), invited "the Secretary-General, in consultation with the Administrative Committee on Co-ordination, to draw up proposals as to the most advisable measures to co-ordinate the formulation and implementation of the programmes of the organs, organizations and agencies of the United Nations system in the field of water, mineral and energy resources development, which would define the competence and sphere of activities of those organizations". In pursuance of this request, the present chapter develops a number of measures aimed at solving the principal problems described in the preceding chapter. It has been prepared with the co-operation of the organizations concerned and placed before the Administrative Committee on Co-ordination during its session in October 1972.

2. In order that the matter may be viewed in its proper context, it should be pointed out that interagency co-operation in the field of natural resources has many features in common with interagency co-operation in other fields such as population, marine science and statistics. In areas where a large number of organizations have to work together on programmes falling within their respective

fields of competence, there is the inevitable accompanying risk of conflicting views and possible duplication. Moreover, decisions in these fields, taking into account all the elements involved, can be formulated only by analysing and, whenever possible, harmonizing the differing views and experience of the various organizations.

3. Disagreements sometimes arise because of conflicting approaches to meeting the needs of developing countries and responding to requests for assistance by Governments. When activities of an operational character are involved, there is sometimes competition for the allocation of field projects, and this situation arouses the most concern, as competition, although it may result in giving closer attention to otherwise neglected problems and act as a spur on efficiency, inevitably introduces an element of confusion and tends to disperse resources, or to distort their allocation.

4. The lack of adequate communcations at the working level may also lead to duplication and a dispersion of efforts. This sometimes occurs because the opportunities for personal contacts are inadequate or because the burden of the day-to-day management of operational activities is a very heavy one. As a result, officials are not always as fully informed as they should be of each other's project activities, particularly if they happen to be working in different organizations and stationed in different continents.

5. The resulting problems of co-ordination tend to be somewhat less serious in terms of the services actually delivered, than may appear on the surface. In the first place, if an area of overlap is of real consequence, the officials concerned will inevitably become aware of each other's activities and will usually endeavour to minimize conflicts for the sake of the success of their own programmes. Secondly, the task is so vast in relation to the combined resources available to the various organizations responsible for carrying it out that there is a role for each to play, and competing claims affect the allocation of resources more than the activities themselves. It follows that although competition for projects may involve an element of imbalance in approach or distortion of priorities, waste of resources due to actual duplication is comparatively rare. Nevertheless tensions between organizations are clearly undesirable and must be kept under control, through the development of a better understanding of the many facets of a single problem, in the interest of the countries concerned.

6. It is one of the chief goals of interagency co-operation to recognize and deal with problems of this kind. In fields such as those referred to above, it has been found useful - and, in some cases, essential - that informal contacts, particularly, between officials located at widely separated points, should be reinforced periodically through meetings. The specific purpose of such meetings is, of course, to deal with business of concern to two or more of the organizations. This business sometimes consists of interagency problems, but more often involves efforts by the organizations to utilize the limited resources most effectively. Furthermore, these meetings provide an opportunity for the officials concerned to have informal personal contacts outside the meeting room. Such contacts are, in the long run, essential to the establishment of an atmosphere of mutual understandi and of working together.

7. It is in this context of the measures applied generally to achieve interagency co-operation that the situation in the field of natural resources may now be evaluated. It must be acknowledged frankly that measures of the kind described above have not always served to ensure in the field of natural resources a proper co-ordination of the various activities and have not always provided a sufficient counter to the centrifugal forces and tensions that have existed in this field. The organizations, accordingly, welcome the present opportunity to review these measures and to see how they could be strengthened and made more effective. The various measures are taken up one by one below.

A. Co-ordination measures

1. Interagency machinery

Sub-Committee on Water Resources Development of the Administrative Committee on Co-ordination

8. Since 1954, the Administrative Committee on Co-ordination has arranged for annual meetings of its subsidiary organ, the Sub-Committee on Water Resources Development, which has, as its principal mandate, the achievement of "a flexible and continuous co-ordination".

9. In 1958, the Secretary-General, at the request of the Economic and Social Council (resolution 675 IV (XXV)), established within the United Nations a Water Resources Development Centre to promote co-ordinated efforts for the development of water resources. The functions of the Centre were modified and somewhat scaled down by Council resolution 1033 D (XXXVII) adopted in 1964 in the light of the difficulties encountered in making the Centre function effectively. There is a divergence of views within the system as to the cause of these difficulties. In the opinion of a number of agencies, they were mainly due to the fact that the staff of the Centre were also dealing with the operational projects executed by the United Nations itself and were, therefore, in a difficult position to perform an impartial co-ordinating role among all the United Nations organizations operating water projects. In the United Nations view, the Centre did not succeed because it did not have authority, for example for allocating water projects financed by UNDP, and because of the unwillingness of the agencies to give any decision-making powers to it. Since 1964 the Centre has acted as the secretariat of the Sub-Committee on Water Resources Development, and has prepared triennial reports for the Economic and Social Council on the water resources activities of the United Nations system.

10. In 1964, when the Council approved a programme of co-ordinated action in the field of water resources within the framework of the First United Nations Development Decade, the Administrative Committee on Co-ordination arranged for the Sub-Committee to "provide the focal point for co-ordination among the participating organizations in the Programme ... and be supplemented by ad hoc consultations on important projects and continuing exchange of information at the technical level" (E/3886, para. 98). In this spirit, the Sub-Committee has recently created a working group on hydrology which met in January 1972.

11. The record of the Sub-Committee and the Water Resources Development Centre is largely reflected in chapter II of the present document (E/C.7/38/Add.1). As has already been indicated, this record is a mixed one and due weight must be given to the misgivings, which have long been felt in some quarters, with regard to the capacity of the organizations to settle their difficulties within the field of water resources through machinery of this kind. 1/

12. On the other hand, it has to be recognized that many of the difficulties encountered by the Sub-Committee reflect less its own inadequacies as a mechanism for co-ordination than the recalcitrance of the problems with which it has had to deal and the divergent approaches taken from time to time by the intergovernmental organs concerned. It is far from certain that new machinery would be able to deal more effectively with these problems. In general, the officials who sit on the Sub-Committee are the technicians with the "operating-level" responsibility for carrying out the water resources programmes of the United Nations system. If the co-ordination of the "formulation and implementation" of these programmes is to be improved, these are the officials who must be involved in working out the concrete arrangements for its improvement. Under the existing circumstances, it is hard to visualize alternative machinery, which would not require the active participation of these officials as well as the full support of their organizations for any co-operative arrangements involving them. It may be more economical and realistic, therefore, at least in the first instance, to seek ways of making the Sub-Committee a more effective body.

13. Moreover, it should be borne in mind that the record of the Sub-Committee is, in some respects at least, a good one and that in recent years considerable progress has been made in a number of areas. In the field of hydrology, for example, a serious problem was faced squarely and agreement reached on the general division of responsibilities between the organizations concerned. The role of the Committee on Natural Resources is an important one and has already given a new sense of urgency to the work of the Sub-Committee. The Administrative Committee on Co-ordination, for its part, assisted by the Office for Inter-Agency Affairs will, likewise, do all it can in that direction.

14. The organizations have concluded in the light of the foregoing consideration, that the Sub-Committee on Water Resources Development should be continued on the understanding that its effectiveness would again be reviewed in a year or two. The success of the Sub-Committee's Ad Hoc Working Group on Hydrology suggests that such ad hoc working groups might be set up in other areas where special difficulties

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1/ The most recent expression of these misgivings was registered in the report of the Joint Inspection Unit on the treatment of water resources development in the United Nations family of organizations (JIU/REP/72/3).

have arisen, Thus, the attention of the Sub-Committee and its working groups would be focused directly on solving the problems mentioned in Chapter II and in preventing potential problems from arising. The views of the Committee on Natural Resources and the Economic and Social Council will guide the bodies of the Administrative Committee on Co-ordination in carrying out these tasks.

15. The organizations have also considered very carefully whether permanent interagency machinery needs to be established in the other two fields of the Committee on Natural Resources' sphere of interest: minerals and energy. They have concluded that the co-ordination problems in these two fields do not justify the establishment of permanent machinery, at least not for the time being, particularly in the light of the strictures of the Economic and Social Council regarding such machinery's being kept to the minimum. Most of the problems outlined in Chapter II involve only two organizations each and may be dealt with on a bilateral basis. However, specific problems involving several organizations can always be brought before ad hoc interagency meetings. Alternatively, such problems could be dealt with by the Preparatory Committee of the Administrative Committee on Co-ordination during its regularly scheduled sessions, as is done in many similar instances.

The contribution of the Administrative Committee on Co-ordination and the Office for Interagency Affairs

16. The Administrative Committee on Co-ordination has been involved in the preparation of the present report, in response to paragraph 2 of resolution 1673 C (LII), and in view of the Economic and Social Council's decision that this report should also serve as the first in-depth sectoral study of the Committee called for in resolution 1643 (LI). The Committee is also prepared, in view of the difficulties in the field of natural resources, to make a special effort to deal with the co-ordination problems in this particular area. To this end, it has instructed its Preparatory Committee to follow the work of the Sub-Committee on Water Resources Development with particular care, and to bring to the notice of the executive heads any problems which seem to warrant their attention.

17. The Administrative Committee On Co-ordination has also instructed the Office for Inter-Agency Affairs to continue to play a more active role in facilitating the co-ordination of natural resources activities. In recent years, the Office has been regularly represented at meetings of the Sub-Committee on Water Resources Development in pursuance of the decision of the Administrative Committee on Co-ordination that the office should be represented at the meetings of all the Committee's subsidiary organs. Moreover, the Office has helped the United Nations Water Resources Development Centre with the preparation of documentation for the Sub-Committee on Water Resources Development and with the reports of its meetings.

18. At the recent Ad Hoc Meeting on Natural Resources, which took place at Geneva from 25 to 27 July 1972, the Office provided chairman and secretary and helped to work out the arrangements that were made for the preparation of the present report.

Procedures for prior consultations

19. As far as measures to co-ordinate the formulation of programmes in the field of natural resources are concerned, attention should also be called to the arrangements already made for prior consultations on work programmes in pursuance of Economic and Social Council resolution 1549 (XLIX). Under these arrangements (which are not limited to natural resources, but cover all activities) draft work programmes are circulated to other United Nations organizations with a request for their comments; these comments are made available where appropriate and possible to the programme-reviewing bodies of the organization concerned before the programmes are adopted. In pursuance of these arrangements, the Committee on Natural Resources, at its last session at Nairobi, received the comments of the agencies on the natural resources programme of the United Nations. The programme-reviewing bodies of the agencies also receive the comments of the United Nations and other organizations on their programmes before they adopt them. However, in many cases, short-term work programmes are not prepared far enough in advance to leave time for organizations to receive and study them and prepare meaningful comments on them. These comments, therefore, are often circulated too late for them to be taken fully into account or may simply be pro forma. The Administrative Committee on Co-ordination is currently exploring possibilities of circumventing these difficulties of the timing of short-term programmes, particularly in fields such as natural resources, and of introducing similar measures into the field of medium-term planning. The development of medium-term programmes by many organizations has opened up new possibilities for much more meaningful co-operation in the whole process of programme formulation.

2. Participation of the United Nations Development Programme and the country programming process

20. Many, if not most, of the problems described in chapter II concern the provision of technical assistance to developing countries. The achievement of a more effective co-ordination of natural resources activities depends, therefore, to a large degree upon systematic, close co-operation at the country level. The new procedures for country programming adopted by UNDP provide a much-needed framework for helping to promote the required interagency co-ordination with regard to field operations, including programmes and projects concerning natural resources. Interagency co-ordination in the field is primarily facilitated by the UNDP resident representative in close collaboration with the appropriate government authorities.

21. The sectoral approach, which is an integral part of country programming, whereby intersectoral and intrasectoral linkages are articulated, is expected to contribute effectively to interagency co-ordination and to strengthen the role of UNDP in rationalizing technical assistance in this area. Increasingly, UNDP is actively encouraging the agencies (within the framework of the Sub-Committee on Water Resources Development, the country programming exercises and the Inter-Agency Consultative Board and its related mechanisms) in the operational integration of natural resources development activities within the strategies of individual countries.

22. The management of interdisciplinary projects executed by one agency in association with one or more other agencies is receiving considerable attention with a view to increasing its effectiveness. The specific scope and nature of the responsibilities and of the activities to be carried out by the associated agency or agencies under the over-all technical and management responsibility of the primary agency is increasingly being spelt out in the preparation of project documents. For example, the actual inputs in terms of man-months and their timing are indicated in specific terms in these documents.

3. Special bilateral interagency arrangements

23. In general, problems that involve only two organizations may be dealt with most effectively by direct consultations between them. It has been found useful in some fields for example, in industrial development, that these arrangements should take the form of bilateral agreements between the organizations concerned. Such arrangements, whether formal or otherwise, should be supplemented by regular meetings between officials of the two organizations to review their respective programmes and to help in ensuring that there is no duplication or overlapping between them. Information about several of the existing bilateral arrangements in the field of natural resources has already been furnished in previous chapters.

24. All the problems regarding minerals and energy that were described in chapter II, including the water desalination problem, involve two organizations only. Some of these problems require decisions of principle by governing bodies on the division of responsibilities between the two organizations, while others will inevitably necessitate continuing attention to programme co-ordination. It is suggested that the organizations concerned should increase their efforts to iron out these difficulties, taking into account the views of the Committee on Natural Resources. The progress that they make in this respect will then be reported to the Committee at its next session.

4. Informal contacts

25. It should perhaps be stressed that in the field of natural resources, as in other fields involving many organizations, informal contacts between substantive officials will continue to constitute the most important method of ensuring the systematic co-ordination of activities at the secretariat level. These informal contacts involve officials at all levels and consist of correspondence, telephone calls and meetings which, if they involve travel, can sometimes be combined with missions for other purposes. The availability of adequate travel funds is obviously essential in this connexion.

26. Arrangements of this kind work well in some areas, particularly where there exists a clear-cut, generally understood division of responsibilities between the organizations concerned. Where this is not the case, as in the field of water resources these informal contacts tend to suffer. It is believed that if the methods described in the preceding sections begin to work more satisfactorily

They will tend to restore such informal contacts in the areas where they have been unsatisfactory and - it is hoped - will provide thereby the basis for a more positive attitude towards interagency co-operation in these activities.

B. Report of the Joint Inspection Unit

27. In June 1972, a report on the treatment of water resources development in the United Nations family of organizations, which had been prepared by C. S. Jha of the Joint Inspection Unit, was circulated to the organizations concerned (United Nations, FAO, UNESCO, WHO, WMO and IAEA).

28. This report contains rather far-reaching recommendations for, inter alia, the creation of a "world water centre" and of four regional centres, one to be attached to each regional economic commission. It also contains recommendations to UNDP and the other organizations concerned with regard to their various activities in the field of water resources.

29. At the time of the preparation of the present report many of the organizations were still weighing the complex recommendations contained in the report of the Joint Inspection Unit and were in the process of preparing their comments. The report had also not been reviewed by the governing bodies of these organizations. It has not, therefore, been possible for the Administrative Committee on Co-ordination to comment on these matters in the present report.

C. Concluding comments

30. It is recognized that the measures outlined above, which are mainly limited to problems of co-operation at the inter-secretariat level, constitute a rather modest response to the wide-ranging organizational concerns preoccupying the Committee on Natural Resources. Moreover, these organizational concerns may be deepened with the probable creation of a new organizational framework for environmental activities, of which natural resources activities form such an important component.

31. It is well to bear in mind, however, that while every effort should be made to solve the complex problems of "division of responsibility" and co-ordination they should not be allowed to overshadow the more important task of providing high-quality assistance to developing countries on an increasing scale.

32. The measures that have been proposed are essentially the classic ones, reinforced by recent efforts of the Administrative Committee on Co-ordination to make its machinery for co-ordination more effective. As has been indicated, these efforts have taken three forms: (a) the exercise of greater leadership and guidance at the secretariat level by the central co-ordinating organs, that is, by the Administrative Committee on Co-ordination itself and its Preparatory Committee; (b) the provision of greater staff support for the technical subsidiary organs of the Administrative Committee on Co-ordination, such as the Sub-Committee on Water Resources Development, through the facilities now available in the Office for

Inter-Agency Affairs; (c) the convening, on an ad hoc basis, of interagency meetings to deal with specific problems as a means of strengthening the existing co-ordination machinery and ensuring greater flexibility in its operation. These efforts to revitalize older methods of co-ordination are being tested in the field of natural resources, and a certain trial period is required before their impact can be judged. It is hoped that the guidance received from the Committee on Natural Resources and from the Economic and Social Council will play an important part in making these efforts successful.
