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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 data 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 assigned 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.

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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". <sup>4/</sup> 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.

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<sup>4/</sup> 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 derived 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).

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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 situation 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

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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 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 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.

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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 available 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.

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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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