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INTERNATIONAL CO-OPERATION ON WATER CONTROL AND UTILIZATION  
Report of the Secretary-General under Council resolution 346 (XII)

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## I. PURPOSE AND SCOPE OF THE REPORT

1. The present report is submitted pursuant to resolution 346 (XII) of the Economic and Social Council, adopted on 9 March 1951, which requested the Secretary-General, "in consultation with the specialized agencies, to submit a report to the Council on the work being done by the specialized agencies and other international organizations, whether governmental, semi-governmental or non-governmental, engaged in the broad field of water control and utilization."<sup>1/</sup>

2. The report is primarily concerned with the description and analysis of the activities of international organizations. In order to obtain necessary information, a letter was sent to the specialized agencies of the United Nations and to eighty-two other international organizations. Of these eighty-two organizations, sixty-four replied, thirty-three of them reporting relevant activities. Annex A of this report contains the text of the inquiry and Annex B contains the list of organizations approached, together with an index of references to them in the present report.

3. The survey of activities presented in this report may, however, be incomplete, either because organizations concerned may not have been approached,<sup>2/</sup> or because some organizations whose activities would be relevant did not respond at all or did not respond fully. While no effort was made to secure data on short-run or ad hoc organizations established to negotiate inter-governmental agreements, every effort was made to cover the

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<sup>1/</sup> The resolution also requested the Secretary-General to take into consideration, in preparing the report which had been requested by the General Assembly in resolution 402 (V) on the practical aspects of the study of the problems of arid zones, the entire field of water control and utilization as it is related to the problems of arid zones. According to that report (E/2191) contains certain additional details on the activities of the United Nations and the specialized agencies in the field of water control and utilization as they affect the problems of arid zones.

<sup>2/</sup> In compiling the list of organizations, reference was made to the organizations registered with the United Nations, to the organizations listed in the UNESCO "Directory of International Scientific Organizations", and a number of other directories of international organizations; additional names of international organizations were suggested by the specialized agencies and a number of individual experts.

activities of continuing inter-governmental organizations.<sup>3/</sup>

4. Major co-operating organizations were given an opportunity to review all statements concerning them in the preliminary draft. They were also invited to make more general comments or suggestions. In addition, the interested specialized agencies were consulted concerning the formulation of the original inquiry and the plan of organization of the report.

5. This report has been organized so as to present the diversified activities of the considerable number of organizations it covers within a common framework. Part II outlines briefly the historical development of international organizations having responsibilities touching the expanding exploitation and safeguarding of water resources. Part III contains summary accounts of the principal interests and activities of the United Nations and the specialized agencies in the field of water control and utilization. In Part IV the activities of all the organizations - United Nations and other international bodies - covered in the survey are summarized and presented by subject of activity (irrigation, power, navigation, etc.) and methods of work employed. In addition, brief descriptions are given of some of the organizations whose primary function is in respect of a particular aspect of water resources, or who devote a large portion of their efforts to water resource activities. Part V contains the conclusions. Supplementary information on the activities of the United Nations, the specialized agencies and eleven of the other international organizations covered in the survey may be found in the addendum to this report (E/2205/Add.1). The addendum is composed of selected statements which were, for the most part, submitted during the period from September to November 1951 in response to the circular request mentioned above, to international organizations for information on their activities. A list of the organizations submitting statements is given in annex C.

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<sup>3/</sup> It should be noted that in the case of many boundary rivers or rivers crossing neighbouring countries, various matters regarding the utilization and control of their waters have been settled through bilateral agreements or arrangements between the interested States, without continuing or permanent organization, and have been further implemented through day-to-day co-operation or periodic contacts between the national administrations concerned.

## II. WATER RESOURCES AND INTERNATIONAL CO-OPERATION

6. Because water resources are indispensable to many types of economic activity as well as to human, plant and animal life, no systematic economic progress can be made without careful account being taken of these basic resources and the manner in which they are to be exploited or controlled. In coping with this universal problem the peoples of the world have gradually accumulated a wealth of experience, which continues to be vastly augmented by the development of new materials and techniques. As this heritage of knowledge has grown, international organizations have arisen to ensure its systematic exchange among various sections of the globe. As will be seen in the present survey, such international activity has been heightened in recent years, with increasing emphasis on the purposes which it must ultimately serve: development of economic potentialities and betterment of living conditions for people everywhere.

7. With the growth of populations, with the expansion of industry, with the extension of the scope and productivity of agriculture, new and heavier demands have been made on water resources. Developed and under-developed areas alike are being confronted with the problems of making better use of their water supplies and of more effectively adjusting to or managing the extreme flows which periodically bring devastation in all continents.

8. In order to protect valley settlements and to utilize the rich alluvial soils deposited by floods, flood control has been practiced for thousands of years, first by the erection of dikes along rivers and later by the construction of reservoirs and by watershed management. In many of these valleys flood waters have been stored and diverted for irrigation; in other areas irrigation has been furthered by storage and diversion of surface waters and pumping of ground water. Today some 80 million hectares of otherwise non-productive lands are being irrigated to furnish food supplies for many millions of families, notably in Asia.

9. Until the comparatively recent development of other forms of transportation, the availability of natural waterways has largely influenced the distribution of the world's population as well as the location of most of its principal cities and the direction of trade routes. Even though industrialization has increased

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the importance of rail, road and air transport, water shipment remains the major means of transport over oceans and an important one in inland areas. In many cases industrially advanced countries continue to devote intensive efforts to the maintenance and improvement of inland waterways, while under-developed areas consider such activities as a means of establishing the improved transportation network they require for further economic development.

10. Through the utilization of the energy of falling water, first directly connected to machines and latterly through hydro-electric installations, increasing amounts of energy have become available until, in 1950, 325,000 million kilowatt-hours of energy were supplied to millions of homes and thousands of industrial plants and transportation utilities throughout the world.. Yet not more than five per cent of the world's potential water-power resources have been developed. The harnessing of this vast power potential holds out a challenge and an opportunity to many countries, especially the under-developed ones, in meeting their expanding energy requirements.

11. The water requirements of a growing industrialism reflected in chemical, metallurgical and other industries have grown by leaps and bounds. These special needs are met by water diverted from streams and rivers, or pumped from the ground. The availability, dependability and quality of such sources may therefore be an important factor in the location and growth of any industrial community.

12. One of the most important resource techniques which has been developed in the recent period is based on the concept of comprehensive development of drainage basins calling for the development of water resources in harmonious relationship to the needs of agriculture, inland navigation, industrial and domestic water supply and electric power, and simultaneously introducing improved land use and soil practices to conserve soil and water, prevent excessive run-off, and eliminate or minimize flood damage. This technique opens up vast possibilities for raising living standards in under-developed countries, as well as maintaining and expanding the energy and agricultural supplies of many of the economically developed countries. It represents an integrated approach, embodying experience gained in specific fields of water control and utilization, each of fundamental importance in its own right.

/13. With

13. With the rapidly expanding use of water resources, both surface and underground, and a growing realization of the great need for control in the interests of conserving and utilizing more fully both land and water resources, the last century - especially the past twenty-five years - has witnessed a steady movement in the direction of collecting, assembling and analysing basic data on water resources and at the same time making a more systematic effort to consider the water resources of an entire region, such as a river basin, in their competitive and complementary uses. The development of storage dams for flood control, navigation, irrigation and power has increasingly been jointly considered, as have also its effects on inland fisheries and recreation. The close relation between, on the one hand, types of vegetation, agricultural practices, water consumption, water retention in the soil and percolation through it, and, on the other, water run-off and erosion, has resulted in greater attention to the classification of land and its proper utilization as a means of ensuring continuing and efficient use of both soil and water. Effective watershed management, including management of forests and grazing and crop lands, is important not only because of benefits therefrom in the watershed but also because it results in an improved supply of usable water for farms downstream and for urban consumption, industry and other uses. While much progress has been made in the discovery and analysis of the various inter-relations mentioned above, and in the collection of relevant basic data, there are still vast needs for future work in these respects, especially in regions where development has been retarded.

#### The role of international organizations

14. The bulk of the work that takes place with regard to the control and utilization of water resources, whether in the form of practical projects, scientific research, or the assembly of basic data, is carried out by national and local organizations. International organizations function primarily, though not exclusively, for the exchange of the experience and information gained through such national or local activity.<sup>4/</sup> This is especially so in the case of international scientific and technical organizations, which constitute the largest number covered in the present survey. The growth of these international

<sup>4/</sup> See footnote 5.

organizations has followed or accompanied developments in various fields of science and engineering, many of which are concerned with water resources. These activities have from their beginning had an international character, being accompanied by the development of internationally available literature and a considerable interchange of teachers, students and research workers. The movement towards the establishment of international technical and scientific organizations began during the last quarter of the nineteenth century as national governmental organizations and technical and scientific societies and institutions increasingly recognized the need to undertake the international exchange of information in their particular fields of interest on a continuing and systematic basis. New organizations were established until together they embraced the major fields of application - navigation, power, water supply, irrigation and drainage, and fisheries - and also the basic sciences of meteorology and hydrology.

15. In reviewing the origins of the principal organizations covered in the present survey, it is apparent that there is a relation between their chronological order and the substance of their activities. The first organizations were set up to deal with problems of navigation, and the oldest of these has been in existence for more than a century. The early activity with respect to navigation reflects problems arising from the joint use of international and boundary rivers as inland water transport became increasingly important with the expansion of trade in Europe.

16. In the scientific and technical field, the World Meteorological Organization, which has recently become a specialized agency of the United Nations, was established some seventy years ago as the International Meteorological Organization. The international activity with respect to meteorology reflects in part the importance of weather predictions for navigation and in part the recognition of the common origin and related characteristics of weather phenomena in neighbouring areas and regions.

17. At the turn of the twentieth century, organizations were established to deal with problems of fisheries and municipal water supply, the former reflecting again the joint international use of certain bodies of water and the latter a desire to exchange and share information and experience.

/18. Following

18. Following the first World War, the desire to exchange on an international basis the experience in various fields led to the creation of a number of scientific and technical organizations covering power, agriculture, water control structures, hydraulics, hydrology and geography, all of which dealt with some aspect of water resources.

19. An outstanding development in the period following the Second World War is associated with the activities initiated by the United Nations and the specialized agencies as part of the world-wide movement to raise living standards, leading to the expansion of such methods as the granting of technical assistance for economic development and measures to increase food and agricultural production and to better health conditions, as well as general activities directed towards the exchange of experience and the improvement of scientific activity on a world-wide scale.

20. For most of the organizations surveyed, their principal concern with water resources was the exchange and interpretation of data and experience respecting some particular aspect of water control and utilization.<sup>5/</sup> For organizations such as the World Meteorological Organization, the International Association of Hydrology, the International Commission on Irrigation and Drainage, the International Water Supply Association, and the scientific and technical organizations concerned with navigation and fisheries, such activities comprise their major functions, while in the case of others it is incidental to the purposes of fostering one or more branches of science or technology as in the cases of the World Power Conference and the International Geographical Union. For inter-governmental and semi-governmental organizations with broad economic or social aims, such functions are incidental to fulfilment of their major purposes.. In this category are the United Nations and some of the specialized agencies, and such regional organizations as the Council for Technical Co-operation in South and South-east Asia, the Caribbean Commission and the Organization for European Economic Co-operation.

<sup>5/</sup> The exceptions are the inter-governmental organizations which have been established for the purpose of regulating the joint use by two or more States of contiguous bodies of water, and the International Bank for Reconstruction and Development, whose primary concern is in the field of financing.



21. The development of relevant activities under the United Nations and the specialized agencies has in part served to expand the number of specialized fields covered and the amount of activity devoted to the international exchange of information. However, the outstanding contribution of these organizations has been to bring to the forefront the relation of techniques to practical problems of economic and social development, with special emphasis on the improvement of conditions in under-developed areas. In the past, experts from countries in these areas participated in only a minor way and sometimes not at all in the major scientific and technical organizations operating in this field, and benefited very little from their work. The technical assistance programme, which has for its major purpose the bringing of world-wide experience and technique to the aid of these areas, has included the customary methods of exchange of experience through conferences and publications but, in addition has provided guidance with respect to general plans and specific projects; also, it has supported the systematic training and education of local scientists, administrators and other specialists. The United Nations and certain of the specialized agencies have also given new emphasis to studies of international experience. Other organizations had made such studies from time to time, through special commissions or committees, but their activity was somewhat sporadic. The United Nations and the specialized agencies are making studies in such important and related fields as health, power, irrigation, flood control and basic data and related techniques. Some of these studies are regional while others are world-wide in character. Although these studies are sometimes of a purely technical character, they more usually seek to relate technical developments to economic and social problems. This represents a relatively new and extremely valuable approach which appears to be gaining acceptance among a number of the other international organizations concerned with water resources..

### III. PRINCIPAL ACTIVITIES OF THE UNITED NATIONS AND THE SPECIALIZED AGENCIES

22. The United Nations, having responsibilities in respect of raising standards of living, of economic development and of technical assistance, has necessarily undertaken many activities involving the use and development of water resources. And of the specialized agencies five have programmes directly related to water resources. Of these, the World Meteorological Organization has, as its primary function, concern for the meteorological aspects of water resources. The Food and Agriculture Organization of the United Nations because of the inseparable part played by water resources in agricultural production, deals with these resources at many points of its activities. The United Nations Educational, Scientific and Cultural Organization, through its interest in promoting scientific and educational activities, engages in work directly and indirectly related to water resources, especially in its Arid Zone Programme. The World Health Organization's interest in water-control projects stems from their public health significance, and the International Bank for Reconstruction and Development grants loans for financing water-control and development projects. Important and expanding series of projects are represented by the technical assistance activities of the United Nations and the specialized agencies. Assistance is furnished at the request of Members in the form of (a) services of experts who work individually or serve in organized teams or missions, (b) the provision of training and education facilities - scholarships, fellowships, and organization of training centres, seminars, tours and demonstrations, and (c) the provision of specialized equipment or other facilities. The United Nations and each of the specialized agencies mentioned furnish technical assistance in their respective fields of interest as they relate to water resources. A brief description, including a statement of the focal points of activity of each of the principal organizations, is given below, and supplementary information is contained in E/2205/Add.1.<sup>6/</sup>

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<sup>6/</sup> A summary, by country, of technical assistance activities relating to the development of arid land, many of which relate to the development and use of water supplies, may be found in E/2191. A summary, by country, of all major technical assistance projects, including water projects, is available in the third and four reports of the Technical Assistance Board to the Technical Assistance Committee.

United Nations

23. The United Nations has been dealing with various aspects of water resources in many of its different activities, especially in connexion with problems of economic development, including technical assistance. Water resources was one of the major topics examined by the Scientific Conference on the Conservation and Utilization of Resources convened at Lake Success during the period 17 August to 17 September 1949. The Conference devoted a separate section to water and treated its conservation and use in comprehensive fashion. This Water Section alone considered eighty technical papers. Related papers were considered by the Fuel and Energy, Forests, Land and Fish and Wildlife Sections as well as at plenary meetings. In all more than 150 papers concerning water were considered.<sup>7/</sup>

24. Under the programme for collection and publication of statistics, data are published in the United Nations Statistical Yearbook and in other reports and bulletins on installed capacity and output of hydroelectric power and on inland waterway traffic. The Transport and Communications Commission of the United Nations and the Secretariat keep under continuing review progress of work done by the various specialized agencies and inter-governmental and non-governmental bodies working wholly or partly within the field of water transport, and the Secretariat maintains liaison with these agencies. It also assists in the development of technical assistance programmes related to inland water transport and maintains close touch with the work of the regional economic commissions in the same field. The Transport and Communications Review, which is issued quarterly, includes articles of general importance and surveys of recent developments in respect of inland waterways. Many of the economic studies of the United Nations touch upon the use of water resources; for example, a study in preparation on world energy resources deals with the hydro-power potential and the problems connected with its use for economic development, particularly in under-developed areas. A cartographic programme directed towards the co-ordination of the activities of the United Nations and other international

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<sup>7/</sup> See Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources, E/CONF.7/7 (8 vols.). Also see E/2205/Add.1 for a list of the conference meetings at which papers on water resources and related papers were discussed.

organizations and the furtherance of national cartographic activities has been initiated and is of relevance because of the role cartography plays in the appraisal of water resources.

25. Technical assistance with respect to water resources is furnished by the United Nations as part of broader economic or resource projects and also in specific fields including water resources appraisal, hydro-power development, flood control, inland waterways transport and water supplies for industries and cities and towns. Experts for various phases of water resource development have been requested by eighteen countries; work is under way in respect of twelve of these requests, regarding four of which reports of missions have been published. Fellowships which provide for study of the techniques and practical experiences in the use of water resources in other areas have been granted to forty-six individuals from under-developed countries. Under the programme a number of meetings of experts and seminars are being held which deal with water resource questions either exclusively or as part of the consideration of more general economic development problems.<sup>8/</sup>

26. An outstanding series of projects are those which have been organized by the Economic Commission for Asia and the Far East. In recognition of the fact that of the 1,000 million population of the region one-half inhabit the valleys of great rivers and many millions are subjected to floods, the Commission recommended the establishment in April 1949 of its Bureau of Flood Control. The scope of the work of the Bureau has since been expanded to cover the broader field of water resource development. The Bureau's projects include analytical studies, the organization of regional and technical conferences, and the provision of technical guidance to national and regional organizations with regard to flood and sediment control and the integrated development of river basins including the development of international rivers. Additional related activities of ECAFE, such as investigations of the development and use of hydroelectric power and the study of navigation problems, are carried out by the Secretariat in servicing the Commission and its various committees and sub-committees.<sup>9/</sup>

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<sup>8/</sup> See E/2205/Add.1 for additional details.

<sup>9/</sup> A detailed statement of the activities of the Bureau of Flood Control, as well as of ECAFE's activities in the fields of hydro-electric power development and inland and intra-coastal navigation, is contained in E/2205/Add.1.

27. As to the two other regional economic commissions, the Economic Commission for Europe and the Economic Commission for Latin America, the former's pertinent activities concern the study of legal problems affecting international co-operation for hydroelectric development, the consistent assessment of the water power resources of Europe and the study of comparative costs of construction of water power plants in various countries.<sup>10/</sup> The Economic Commission for Latin America does not at present engage in any activities in this field, except that many of its economic studies, especially studies of individual countries cover the progress which is being made in power production, including water power.

#### World Meteorological Organization

28. Among the specialized agencies, the World Meteorological Organization is the only one whose main interest represents an aspect of water control and utilization. It was formally established as a specialized agency of the United Nations in April 1951, but is the successor of the International Meteorological Organization which had been in existence for over seventy years. The organization and its members are concerned with the measurement and appraisal, according to standardized procedures, of the water precipitated and evaporated from the earth's surface as well as the statistical elaboration and study of the results of these measurements. The organization is also concerned to ensure the adequacy of the world network of meteorological stations. WMO has a number of permanent commissions which are responsible for making recommendations to the Executive Committee and Congress on operating problems such as exchange of data, preparation of maps, etc., as well as for the promotion and evaluation of technical research in their respective fields. WMO is planning to publish condensed statistics of basic meteorological data, world climatological statistics of the surface and upper air, a World Meteorological Bulletin, and the technical resolutions of WMO, based upon the resolutions of IMO, its predecessor. These publications will contribute significantly towards universal standardization of meteorological practices and procedures. The organization has facilities and has expressed

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<sup>10/</sup> A detailed statement of the activities of ECE is contained in the Addendum.

its desire to participate in any meteorological aspects of international collective enterprises and to provide technical assistance to Members of the United Nations and other States on request.<sup>11/</sup>

Food and Agriculture Organization of the United Nations

29. The Food and Agriculture Organization has an active programme concerning the utilization and control of water in relation to crops, livestock, forests and fisheries, and it also gives consideration to the effect of land utilization, through agriculture, forests and grazing, on watersheds and inland waters. One of the important projects of FAO is concerned with the development of national and international programmes and policies for land and water utilization and conservation, including the collection of basic information. This was begun at the Fifth Annual Conference in November, 1949 and is a continuing project. The organization has promoted establishment on a regional basis of bodies such as the European Working Party on Land and Water Utilization and Conservation, members of which have been appointed by ten of the fifteen participating countries. Also, owing to its interest in agricultural development in arid zones, FAO provides technical assistance for the discovery and efficient use of water supplies in such zones and co-operates with the Advisory Committee on Arid Zones of the United Nations Educational, Scientific and Cultural Organization. The three regional Forestry Commissions of FAO take into account such questions as torrent control and soil conservation. Consideration is being given to the convening of a meeting in 1953 of technical experts on torrent control. A document has been prepared setting forth minimum principles of forest policy in which is stressed inter alia the effect of forests in soil and water conservation. FAO has sponsored the Indo-Pacific Fisheries Council, the Latin American Fisheries Council, and the General Fisheries Council of the Mediterranean, the aims of which are the development and proper utilization in their respective regions of living aquatic resources. Training centres and training courses which have included various aspects of water resource utilization, have been organized in various regions by FAO, which also provides direct advisory assistance to member governments on irrigation, drainage,

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<sup>11/</sup> The World Meteorological Organization is more fully described in E/2205/Add.1.

the management of inland waters, etc. An international meeting on improved irrigation and drainage practices on farm lands is being convened by FAO to take place in 1952.<sup>12/</sup>

The United Nations Educational, Scientific and Cultural Organization

30. In the work of the United Nations Educational, Scientific and Cultural Organization, the question of water control and utilization is related to a number of its regular programmes, such as scientific co-operation, financial assistance to international non-governmental organizations, exchange of scientists, educational activities, teaching and dissemination of science, and mass communication. The most important project within the scope of this report is UNESCO's Arid Zone Programme, preliminary consideration of which was begun as early as 1947. This continuing project is now carried on under the guidance of a standing Advisory Committee on Arid Zone Research and is devoted to the encouragement of research on the various problems of arid and semi-arid regions. A detailed report of the work accomplished by UNESCO under this programme is included in the report on problems of arid zones (E/2191) mentioned earlier.<sup>13/</sup>

The World Health Organization

31. The interest of the World Health Organization in respect of water control and utilization is inherent in the public-health significance which attaches to water projects, whether of flood control, impounding of water, irrigation projects utilizing either surface or underground water, drainage projects or domestic water supply. WHO has recommended to member governments that plans for such projects should be so framed as to include measures to prevent the introduction or aggravation of disease and to conserve collateral benefits leading to improved health, and the organization provides technical assistance to governments on request in this connexion. Moreover, the large-scale WHO programme in malaria control, and its programme in the control of bilharziasis - a disease whose incidence is frequently related to the introduction of irrigation schemes - as well as its work in environmental sanitation, are

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<sup>12/</sup> A more detailed statement on the work of the Food and Agriculture Organization is contained in E/2205/Add.1.

<sup>13/</sup> UNESCO work related to water utilization generally is described in greater detail in the statement contained in E/2205/Add.1.

closely related to water use and control. In these activities, the WHO aim is to raise the level of international knowledge regarding the causation and control of disease, to stimulate and assist governments to improve sanitary organization, to promote the training of sanitation and other personnel, and to promote the exchange of information. It accomplishes its objective in these respects by dispatching experts, demonstration teams and consultants to various countries, by awarding fellowships for the training of personnel, by the collection and publication of data on problems, needs and existing facilities - in relation, for example, to environmental sanitation - by convening conferences and seminars, and by the promotion of research by committees of experts.<sup>14/</sup>

The International Bank for Reconstruction and Development

32. The International Bank for Reconstruction and Development, by virtue of its responsibilities in the field of financing of projects of economic development, undertakes on the request of governments economic and technical surveys regarding the feasibility of water-use projects such as those for hydroelectric power development, irrigation, flood control and navigation. Where projects are found to satisfy the requirements of the Bank, loans may be granted for these purposes, upon the request of member governments, to governmental bodies or to public or private corporations. By the end of March 1952, Bank loans related directly to water control and utilization amounted to a total of \$221.4 million.<sup>15/</sup> Of this total a loan of \$181.6 million was for the development of hydroelectric power. Loans for this purpose were made to

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<sup>14/</sup> A more detailed statement on the work of the WHO is contained in E/2205/Add.1.

<sup>15/</sup> It should be noted that this figure does not include a number of loans which are related to water-resources development but which cannot be broken down so as to show component amounts to be used specifically for water-resource purposes. For instance, a loan of seventy million dollars was made in September 1951 to the Belgian Congo and the Kingdom of Belgium to assist in the development of the Congo. The main purpose of this loan is to help pay for general imports into both the Congo and metropolitan Belgium, demand for which is generated by the economic activity incidental to carrying out the ten year development plan for the Congo. Disbursements under this loan, however, are related directly to progress made in improving water transportation on the Congo and its tributaries. Similarly a loan of ten million dollars made in October 1951 to Italy - and not included in the \$221.4 million total - will aid in the carrying out of a ten-year programme for the development of southern Italy; and this programme comprises such relevant projects as reclamation and irrigation of coastal areas and river valleys and the construction of aqueducts.



Brazil, Chile, Colombia, El Salvador, Finland, France, Iceland, India, Mexico, Uruguay and Yugoslavia. Loans for irrigation, flood control and river navigation were made to the Belgian Congo, Chile, Iraq, Italy, the Netherlands and Thailand. Altogether, nineteen countries have received loans from the Bank for the development of their water resources.<sup>16/</sup>

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<sup>16/</sup> For a more detailed statement of the work of the Bank, see E/2205/Add.1.

#### IV. SUMMARY OF ACTIVITIES OF ALL ORGANIZATIONS SURVEYED BY SUBJECT AND TYPE

33. In order to provide a common framework for the presentation of the reports of co-operating organizations as well as for the analysis of their activities, classifications by subject and type of activity were prepared for the present survey.<sup>17/</sup>

34. The survey was necessarily restricted to activities which are most directly related to water control and utilization. Even with this limitation, however, it was frequently difficult in practice to isolate water-resource activities where they form an essential part of a larger-purpose project. For example, the World Health Organization, in its world-wide campaign to eradicate malaria, pays attention to the problem of stagnant waters which are the breeding places of the mosquitos bearing the malaria infection. It is not practical for that organization, however, to attempt to keep a record of the separate guidance which is provided in particular localities with respect to this aspect of malaria control. For this reason, it is difficult to identify the precise amount of the financial support given for water-resource activities. Further, it had been hoped that it would be possible to secure these financial data for all organizations and to present a summary of them by subject. The data collected have proved inadequate and are therefore presented only within the

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<sup>17/</sup> These classifications were introduced in the original inquiry (see annex A), and have been slightly modified for purposes of this section in the light of the activities which were reported. The principal modifications are the following: "Industrial and domestic water supply" is replaced by "Water supply and sanitation"; "Irrigation" and "Drainage and reclamation" are combined; "Recreation" is omitted; and a number of specific techniques listed under "Basic data, techniques and problems" are not discussed separately.

more detailed description of activities of selected organizations contained in E/2205/Add.1.<sup>18/</sup>

Comprehensive development and use of water resources

35. As noted earlier, the integrated development of water resources represents a relatively new approach. It involves the simultaneous consideration of the water resources in a definite drainage basin or other natural geographic area in relation to the different types of application to which they can be put. Depending on the resource conditions, the meeting of specific needs - navigation, flood control, power, irrigation, etc. - may be facilitated by their joint consideration and implementation, or there may be a conflict which would require the satisfying of one wholly or partly at the expense of the other. This type of development is being practised to an increasing extent and considerable experience has been gained in meeting the problems involved. There is, however, no single international organization continuously concerned with the problems of such multiple-purpose use of water resources on a world-wide scale. Certain regional organizations deal with this subject on a continuous basis while organizations which operate on a world basis treat it, if at all, in conjunction with other matters.

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<sup>18/</sup> The activities of two of the organizations which co-operated in the present survey, the Engineers Joint Council and the National Association of Manufacturers, are not described here because these activities are carried out largely in a national rather than an international framework and therefore outside the scope of this report. However, through their relations with international organizations, including the United Nations, the former has consultative status (Category B) and the latter is in consultative relationship (on the Register of the Secretary-General); these organizations fulfill a noteworthy role in respect inter alia of water control and utilization activities. The Engineers Joint Council includes in its membership, moreover, over 8,000 individuals outside the United States, and some of the constituent societies of the Council have local sections or chapters in other countries. The member societies of the Council - the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Institute of Chemical Engineers - issue a large number of regular and special publications, which are exchanged with many engineering and scientific bodies and libraries throughout the world. The National Association of Manufacturers in co-operation with the Conservation Foundation has recently made a survey of water use in industry, as a result of which a publication entitled "Water in Industry" was issued.

36. Multiple-purpose development is a subject which has received the attention of the United Nations and the specialized agencies in connexion with a number of programmes. It was one of the important topics considered in both plenary and water section meetings of the United Nations Scientific Conference on the Conservation and Utilization of Resources held in 1949 and is presently under examination in conjunction with the preparation by the United Nations of a report on world energy resources. Under the technical assistance programme the United Nations, the Food and Agriculture Organization and the International Bank for Reconstruction and Development have jointly sponsored training institutes held in the Far East, the Middle East and Latin America dealing with the formulation of development projects at which multi-purpose river development was among the subjects considered. These organizations have also separately or jointly sent to a number of countries comprehensive technical assistance missions which have, as part of their general study, considered the integrated development of water resources (hydroelectric power and other uses).<sup>19/</sup> The United Nations is also rendering technical assistance through individual experts to a number of countries where specific guidance is being furnished with respect to multi-purpose development plans and projects; fellowships have also been granted for study of multi-purpose river development.<sup>20/</sup>

37. At the regional level the Bureau of Flood Control of the United Nations Economic Commission for Asia and the Far East is developing a continuous programme to promote multi-purpose development. A comprehensive study of river-basin development in Asia and the Far East is in preparation. The Bureau also plans to organize, in 1953, in conjunction with and financed under the technical assistance programme of the United Nations, an Asian training centre for water-resource development, and to hold a regional conference on water-resource development in 1954. In a special study of the Mekong River

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<sup>19/</sup> The Bank has sent technical assistance missions to Ceylon, Chile, Colombia, Cuba, Guatemala, Iraq, Jamaica, Surinam, Turkey and Uruguay. All of these missions have given consideration to water-resource development. Reports have been published on the missions to Colombia, Cuba, Guatemala, Iraq, Turkey and Uruguay. Reports of missions to the other countries mentioned are in preparation.

<sup>20/</sup> See E/2205/Add.1.

Basin being made by the Bureau jointly with Thailand, Laos, Cambodia and Viet-nam, multi-purpose development is being considered in conjunction with flood control. Technical assistance for multi-purpose developments in part of this region is also within the scope of the Council for Technical Co-operation in south and South-east Asia (Colombo Plan).<sup>21/</sup> The Council has before it a request to provide technical assistance for a project in Ceylon which would improve irrigation facilities for 6,000 hectares of land and bring under irrigation an additional 16,000 hectares; in addition 4,800 kilowatts of hydroelectric capacity would be installed.

38. Another regional organization, the Inter-American Council of Commerce and Production, has recommended the stimulation in Latin America of irrigation, generation of hydroelectric power, and other uses of water towards industrial and agricultural ends and has sponsored a study along these lines.<sup>22/</sup>

39. The United States and Canada created the International Joint Commission in 1909 for the settlement between the two countries of all questions involving the rights, obligations, or interests of either with respect to their joint water resources, including boundary waters, rivers flowing out of boundary waters, and rivers flowing across the boundary. The international boundary between the two countries passes, for a distance of some 2,055 miles or fifty-four per cent of its entire length through a series of lake and river waterways, and elsewhere is crossed and recrossed by a number of rivers and streams. The Commission has vast scope and a great variety of duties and powers, including the power to decide finally any question, whatever its nature or wherever it may arise in either country, which may be referred to it by the Governments of Canada and the United States. One of the principal functions of the Commission is to make investigations, reports and recommendations regarding references sent to it, as well as to approve applications. The waters of the St. Lawrence have been studied and recommendations made to the two

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<sup>21/</sup> This organization was established in 1950 by the Governments of Australia, Canada, Ceylon, India, New Zealand, Pakistan, and the United Kingdom for the purpose of assisting in the economic development of South and South-east Asia by the provision of technical assistance through the facilitation of training of personnel, through missions abroad to study the latest techniques or practices, through advisory missions to assist the Member governments in the region in planning developments, and through the provision of equipment.

<sup>22/</sup> "Utilizacion de Rios Internacionales para la Produccion de Energia Hidroelectrica y Otros. Fines Industriales o Agricolas", by Carlos A. Volpi, Montevideo, 1946.

governments concerned which have been partially implemented. The Commission is currently investigating the Columbia River and the waters in the vicinity of the boundary between the United States and Canada from the Continental Divide to the St. Mary's River with a view to recommending comprehensive developments of mutual advantage to both interested countries.<sup>23/</sup>

40. Parallel with the International Joint Commission, the International Boundary and Water Commission, of the United States and Mexico, dating from 1889, is charged with examining and deciding all questions arising on the portions of the boundary between the two countries formed by the Rio Grande for some 1,210 miles and the Colorado River for some twenty miles, and with supervising the equitable distribution and utilization of the waters of the Colorado and Tijuana Rivers and of the Rio Grande between Fort Quitman, Texas and the Gulf of Mexico. With respect to the Rio Grande the Commission's most important activities concern the application of the provisions of the Water Treaty of 8 November 1945 providing for the construction of international works for storage, regulation, diversion and utilization of the waters between Fort Quitman and the Gulf of Mexico, with a view to conserving for beneficial use several million acre-feet of water wasting annually into the Gulf of Mexico. Similarly on the Colorado River the Commission is responsible for the construction, operation or maintenance of various projects. It is also engaged in making studies and investigations respecting possible additional projects for the conservation of the waters of the Tijuana and Santa Cruz Rivers. In addition, the Commission's activities include studies, investigations, planning and construction of works for the solution of sanitation problems arising on the boundary; the elimination of "bancos" under the Convention of 1905; and determinations as to the permissibility of works proposed for construction in the boundary streams.<sup>24/</sup>

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<sup>23/</sup> See E/2205/Add.1 for a detailed description of the work of the International Joint Commission.

<sup>24/</sup> A detailed description of the work of the International Boundary and Water Commission is contained in E/2205/Add.1.

### Water supply and sanitation

41. Ranking first in any system of priorities are the requirements of water supplies for human consumption, agriculture and industry. The meeting simultaneously of these requirements is an important problem for both industrialized and under-developed countries. Especially as economic development proceeds, the latter are seeking to increase their industrial and agricultural production and to introduce more modern systems of water supply and sanitation. In the review which follows, the summary of the health activities pertinent to this report is combined with the summary of the activities relevant to water supply, since one of the most important problems in this connexion is the prevention of contamination.

42. The World Health Organization has been concerned in a number of its health programmes with eliminating water-borne diseases such as cholera, dysentery and typhoid fever. Also, as part of its general environmental sanitation programme, WHO promotes improved sanitary organization, the training of sanitation personnel and other educational activities, and the exchange of information on sanitation. WHO has organized comprehensive programmes, including field projects in environmental sanitation which deal, among other things, with the sanitary control of water supplies. On the American continent WHO works through the Pan-American Sanitary Organization, which constitutes the WHO Regional Office.<sup>25/</sup> The United Nations and the Food and Agriculture Organization have dealt with problems of water supply under technical assistance as a function of comprehensive economic and technical missions, of individual experts and of training and education projects.

43. The problem of providing pure, uncontaminated water supplies is the main interest of a number of other international organizations, none of which, however, function on a world-wide basis. The International Water Supply Association, whose major area of activity is at present Europe, seeks to improve technical, legal and administrative approaches in this field. It held its first General Assembly and Congress in September 1949 in Amsterdam, where the subjects discussed included (a) general topics, such as government measures for the development and assistance of rural water supplies, domestic and

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<sup>25/</sup> The Pan-American Sanitary Organization has, with changes in organizational form, been in existence since 1902.

industrial consumption of water taken from the public supply, and its past and future development, technical nomenclature in water supply, and public relations and (b) special topics, such as disinfection of water conduits, construction and operation of rapid gravity and pressure filters, and so forth. The Second Congress is planned for June 1952, to be held in Paris.<sup>26/</sup>

44. In Latin America, The Pan-American Sanitary Organization and the Inter-American Association of Sanitary Engineering have been active in problems relating to water quality in relation to health hazards, with much emphasis being placed on rural sanitation. Educational activities have taken the form of fellowships and publications and planning courses for water-plant operators in several Latin American countries under the expanded programme of technical assistance. Consultative services are also supplied to national governments and organizations. The Inter-American Association of Sanitary Engineering, which collaborates closely with PASO aims, among other things, to establish uniform standards for public health in the Americas and is endeavouring to promote the development of sanitary engineering and the establishment of common standards and uniform terminology in sanitary technology - through the exchange of information by conferences and the publications of a quarterly journal.<sup>27/</sup>

45. The Inter-American Municipal Organization and the International Union of Local Authorities, who are interested primarily in town planning and urban administration, also have an interest in the technical and legal aspects of sanitation and public works enterprises. The Union has published a report on "Water Supply and Sewerage" which was presented at its last Congress held in June 1951.<sup>28/</sup>

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<sup>26/</sup> The International Water Supply Association was established in 1947 to cover the specific field of public supply of water through pipes for domestic, agricultural, and industrial purposes; national organizations representative of the water-supply interests of fourteen countries are corporate members and its major field of activity is at present Europe. See E/2205/Add.1 for a fuller description of this organization.

<sup>27/</sup> This organization was established in 1946. See E/2205/Add.1 for additional details.

<sup>28/</sup> The former had its beginnings at the Sixth International Conference of American States in Havana in 1928 and was finally established following the First Pan-American Congress of Municipalities, also in Havana, in 1938. The Union was founded by the First International Congress of Towns held in Ghent, Belgium in 1913. The two organizations maintain co-operative relations with each other.



Energy production

46. The energy available in the falling and flowing of streams is an alternative source to that from fuels, which presently constitute the principal sources of energy. Unlike the latter, it is not depleted by exploitation, and moreover, under certain conditions, can provide the cheapest source of power, especially when the power is required in the form of electricity. The hydro-power potential of industrialized countries has only partially been harnessed; in many under-developed countries where these resources remain virtually untouched the harnessing of this energy is one of the essential elements of plans for economic development.

47. The use of water power for energy production is a subject of continuing concern on the part of the United Nations and a considerable number of other international organizations as part of larger fields of interest. The United Nations is dealing with hydro-power under its economic, statistical, and technical assistance programmes. Hydroelectric production of energy was a major topic in the programme of the United Nations Scientific Conference on the Conservation and Utilization of Resources, and the magnitude and extent of use of hydro-power resources is being examined in a study on world energy resources now in preparation. The Statistical Yearbook includes official data on hydroelectric power capacities and production. The World Economic Report and the annual economic reports of the regional economic commissions have dealt with the subject of energy production, and special country studies such as those prepared for the Economic Report for Latin America contain additional information on the relation of energy production to industrial development. The Economic Commissions for Europe and for Asia and the Far East deal with this subject in special committees, the former considering such questions as rural electrification and daily pumped storage, and the latter examining such questions as hydro-power potential and the co-ordinated development of hydro and thermal power.

48. Hydroelectric power development has been dealt with by the United Nations under the technical assistance programme as of interest to general economic development missions and under special projects. It has also been covered in training institutes, and fellowships have been granted for training in both technical and administrative aspects. The Bank has also made surveys and advised on hydro-power development, which accounts for a greater portion of the loans  
/of the International

of the International Bank for Reconstruction and Development than any other single type of water development.<sup>29/</sup>

49. The joint commissions of the United States and Canada and of the United States and Mexico as part of their more general responsibilities for dealing with joint water resources have made investigations and recommendations regarding a number of hydroelectric power projects. The Council for Technical Co-operation in South and South-east Asia provides technical assistance for hydroelectric power development and is arranging to assist a project on the Walawe River in Ceylon. The Organization for European Economic Co-operation established in April 1948 has been concerned with this subject in its Committee on Electric Power and Committee on Overseas Territories.

50. One of the principal organizations operating in this field is the World Power Conference, founded in Great Britain in 1924 to form a link between the different branches of power and fuel technology; between the experts in different countries throughout the world; and between engineers and fuel technologists, on the one hand, and administrators, scientists and economists, on the other. Forty countries are members of the Conference, in thirty-seven of which National Committees have been formed. Plenary meetings are held every six years, and two or three sectional meetings between plenary meetings. The Conference prepares and publishes, on a uniform basis, basic data on fuel and power resources, and annual statistics on the production and consumption of all forms of energy. Through the International Electrotechnical Commission, an organization devoted largely to setting of standards, the Conference was instrumental in setting up standards for the rating of rivers for power purposes. The Conference contributed to the Scientific Conference on the Conservation and Utilization of Resources and is undertaking to co-ordinate its statistical activities with those being carried out by the United Nations under its resources and statistical publications programmes. The Conference is **a founder-member of the Union of International Engineering Organizations,** and also sends observers to the Advisory Committee on Arid Zone Research of UNESCO.<sup>30/</sup>

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<sup>29/</sup> See E/2205/Add.1.

<sup>30/</sup> For additional details on the World Power Conference see E/2205/Add.1.

51. Another international organization active with respect to energy production is the International Union of Producers and Distributors of Electric Energy, which was founded in 1925 with headquarters at Paris. This organization holds periodic congresses for the discussion and exchange of information on all questions concerning the production and distribution of electric energy and publishes periodically international statistics thereon. The organization works closely with the World Power Conference.

#### Irrigation, drainage and reclamation

52. The reclamation of land may be accomplished either through irrigation or through drainage. The main purpose of such reclamation is the increase in area of agricultural land and consequently the increase of agricultural production. Irrigation may also be employed to increase the productivity of land already in use. The general techniques of water supply, whether from surface or ground waters, are essential as well to the practice of irrigation. There are, however, specialized techniques and problems connected with the provision and use of water for irrigation, such as canal structures, water logging and excessive mineralization. There is also a very considerable specialized experience relating to drainage. Due to the inauguration of substantial activities since the Second World War there are now a considerable number of international organizations concerned with these subjects. Outstanding among them is the Food and Agriculture Organization of the United Nations, whose activities include the arranging of meetings for the exchange of experience and the provision of technical assistance to member governments. The question of irrigation is being given attention in the organization's programme for the development of national and international programmes and policies for land and water utilization and conservation, under which proposed irrigation developments would be reviewed, as would other large land and water development schemes, from the standpoint of national or international welfare. A publication entitled "Essential considerations for irrigation and development" has been prepared and another paper, now in preparation, "Methods of soil mapping and classification", will deal with methods of irrigation, drainage, and control of salinity.

53. The Food and Agriculture Organization also participates in the work of the Advisory Committee on Arid Zone Research organized by UNESCO, which has  
/included consideration

included consideration of certain scientific aspects of irrigation in arid areas. UNESCO has awarded fellowships in this same field under the expanded technical assistance programme. Upon the advice of its Fundamental Education Mission to the Middle East, UNESCO, together with the World Health Organization, established two local educational programmes dealing with the health and agricultural problems of irrigated areas. WHO has made provision for the furnishing of consultants to countries in the preliminary stages of new irrigation schemes to make surveys and appropriate recommendations for precautionary measures against the introduction of the disease of bilharziasis. The feasibility of irrigation and drainage projects in various parts of the world has been studied by the ~~Bank for Reconstruction and~~ Bank for Reconstruction and Development and technical advice given to countries accordingly. The Bank has made loans to help finance irrigation and drainage projects in Chile, Iraq, Italy and Thailand. Specific irrigation projects are also the concern of the joint commissions of the United States and Canada and the United States and Mexico; and the Council for Technical Co-operation in South and South-east Asia is prepared to provide technical assistance for specific projects where necessary.

54. The recently established International Commission on Irrigation and Drainage, a non-governmental organization providing a clearing house of knowledge relating to the technique of irrigation and drainage, considers all matters relating to planning, financing and construction of irrigation and drainage undertakings for the reclamation of land as well as the design, construction and operation of appurtenant engineering works including canals and drainage works.<sup>31/</sup> At its first Congress held in January 1951, concurrently with the World Power Conference and the Congress on Large Dams, two main items on the agenda were "A national review of irrigation developments and practice" and "Present-day problems in irrigation and drainage". The Commission has prepared a comprehensive questionnaire for collecting information concerning the development of techniques and practices of irrigation and drainage, including their economic and social aspects. On the basis of data collected

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<sup>31/</sup> The organization, originally sponsored by the Government of India, was set up in June 1950, with headquarters in New Delhi. Any country is eligible to participate in the activities of the Commission and can become a 'Participating Country'. For a list of the eighteen countries from various parts of the world comprising the present membership, and for additional information, see E/2205/Add.1

treatises will be published and given public dissemination. The Commission will also publish an annual bulletin and the transaction of its congresses. The Commission is one of the founder members of the Union of International Engineering Organizations; sends observers to the Advisory Committee on Arid Zone Research of UNESCO, and is co-operating with UNESCO in the publication of inter-lingual technical dictionaries.

55. Closely allied to problems of irrigation and drainage are the operations of the International Society of Soil Science and those of the International Commission on Rural Engineering. The former deals with scientific aspects, while the latter deals with both scientific and practical engineering questions. The International Society of Soil Science was founded in 1924 for the purpose of fostering all branches of Soil Science. Its membership is comprised of the national sections of approximately twenty countries from all parts of the world. It accomplishes its objective through convening congresses and holding symposia, commission meetings, exhibitions, excursions, and so forth. The Society has six scientific commissions as follows: Soil Physics, Soil Chemistry, Soil Biology, Soil Fertility and Plant Nutrition, Soil Genesis, Classification and Cartography and Soil Technology. It is the work of the latter commission which is pertinent to the present survey inasmuch as the commission deals with erosion control, drainage, irrigation and tillage. FAO maintains active consultation with the International Society of Soil Science and receives assistance from the Society's nomenclature committees in connexion with the FAO Draft Glossary of Soil Terms in Eight Languages. The International Commission of Rural Engineering has only recently become active although its beginnings date back to 1930. Its present membership consists of delegates from fifteen countries and territories in Europe and Africa; it anticipates an expansion of the membership, however, to include countries in America and Asia. The organization maintains close working relations with the Food and Agriculture Organization of the United Nations and with le Bureau Inter africain des Sols. During 1950-51, the questions dealt with which are pertinent to this survey were (a) quantity of water for irrigation, (b) methods of measurement of the permeability co-efficient, (c) influence of re-afforestation on underground waters, (d) correction of torrents and (e) erosion of soils and stabilization of their structure. These were the subjects of exchange of information between

/experts

experts and of questionnaires circulated with a view to co-ordination of research, and were discussed at the Congress which was held in Rome in 1951, the proceedings of which will be published during 1952.

#### Flood control

56. The flow in a river may vary considerably from time to time, depending on the precipitation and the snow melt, as well as the previous infiltration of water in the ground. Floods are those exceptionally large flows which periodically cause or threaten danger to human life or human activity; they are determined not only by the magnitude of exceptional stream flows but by the locations which are chosen for settlement and development. In order to exploit streams for their water supply and frequently also for navigation, cities often were built in locations which are periodically threatened by floods. Valley lands are cultivated for agricultural purposes, and their fertility may be due to the very floods which periodically over-run them. The problem of floods is common to almost all parts of the world, but is a particularly grave problem in the Far East, where alluvial lands are settled by millions of people and where the technique of agricultural production frequently exploits the recurring floods, provided they are not too extreme. The Bureau of Flood Control of the United Nations Economic Commission for Asia and the Far East is the principal organization active in this field. One of the Bureau's projects of the highest priority, begun in April 1949 and continuing, is an analytic study of a technical nature on the improvement of flood-control methods, including sediment control. The secretariat assigned to this project have the assistance of the chief engineers, superintendent engineers, and research directors of national and regional technical organizations of countries of the Economic Commission for Asia and the Far East region. The results of the study are being published in the Bureau's "Flood Control Series". Another project is the study on bank protection and river training from the viewpoint of flood control, navigation and irrigation. In another project, in the Mekong River Basin, flood prediction, flood control and water resources development are the subjects of study and promotional activity. This was begun in August 1951 and is a continuing project. Other activities include clearing-house service and publication of technical information, such as the quarterly entitled Flood Control Journal and the Flood Control Series; co-ordination of research,

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which is a project being carried out in close co-operation with the hydraulic laboratories of the countries of the region; and the convening in January 1951 of a regional technical conference on flood control, in close co-operation with technical organizations of the region, interested specialized agencies of the United Nations and international technical organizations. Lastly, a distribution within the region of books on flood control and allied problems is being made during 1952 as a project executed under the technical assistance programme.

57. The International Bank for Reconstruction and Development has made a loan in connexion with a flood-control project on the Tigris River in Iraq. The Food and Agriculture Organization considers flood control an integral problem in the work of its regional forestry commissions, particularly in Europe where, in most countries, torrent control and soil conservation in high mountains are traditionally the direct responsibility of forest services. At present FAO is considering the possibility of convening a special meeting in 1952 of technical experts on torrent control, at which the subject of protection from avalanches would receive full attention. Action on specific flood-control problems relating to the joint waters of the United States and Canada, and the United States and Mexico, is taken by the two Commissions charged with application of the respective agreements regarding the use of these waters. And in addition, as regards problems of flood control in South and South-east Asia, the Council for Technical Co-operation has provided experts as consultants.

58. Contributions to the problems of flood control are also being made by a number of other scientific and technical organizations whose activities are described under the headings of "Irrigation, Drainage and Reclamation", "Soil Erosion and Watershed Protection", and "Basic Data, Techniques and Problems". These include the International Commission on Rural Engineering, the International Society for Soil Science, the Pacific Science Association, the International Association of Hydrology, and the International Association for Hydraulic Research.

#### Soil erosion and watershed protection

59. Wind, water, soil and plant life interact on one another. The nature of this interaction and the steps to be taken to limit soil erosion and to  
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control the headwaters of streams which originate in the watersheds are receiving the attention of a number of organizations. The Food and Agriculture Organization has been dealing with these questions under its programme of development of national and international policies for land and water utilization and Conservation, preliminary discussion of which began at the Fifth Annual Conference in November, 1949, and is continuing; in the work of experts in the field as part of directly advisory services; as a topic of discussion at various conferences of FAO's organs; and as a subject of analytical studies. FAO also has in progress, in co-operation with the Conservation Foundation, a world-wide survey of the incidence of soil erosion. Relevant activities of UNESCO are (a) the granting of several fellowships for work on problems related to arid or semi-arid areas, among which were fluid and soil mechanics, including soil erosion, and (b) the establishment of the Fundamental Education Regional Centre for Latin America at Patzcuaro, Mexico; the latter is a semi-arid region and one of the problems of the district which is being considered by the Centre is that of deforestation, with its accompanying soil erosion and aridity.

60. The Commission on Soil Erosion of the International Geographical Union is at present working on (a) the compilation of an annotated bibliography on the distribution of soil erosion in the world; (b) the compilation of comparable maps on the world extent of soil erosion of different types, correlation of erosion with different systems of cultivation or other cultural features, physical environment of the eroded areas, and other pertinent data which can be expressed cartographically, such as the extent of soil conservation organization, and remedial measures. The International Geographical Union co-operates with UNESCO, receives from it grants-in-aid, and maintains relations with other specialized agencies.<sup>32/</sup> The Pacific Science Association, through standing committees, has dealt with such subjects as the cultivation of lands with steep slopes, forest fires and resulting damage in waste land and uncontrolled flooding and erosion. This Association maintains co-operative relations with UNESCO, FAO, WHO, WMO and

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<sup>32/</sup> The International Geographical Union was established in Brussels in 1922 and its membership is formed by the National Committees of thirty-five countries. Pertinent to the present report is the work chiefly of two of its fourteen units, namely the Committee on Arid Zone Research and the Commission on Soil Erosion and World Land Use. See E/2205/Add.1 for additional details.



other specialized agencies of the United Nations.<sup>33/</sup> The International Association of Hydrology, whose principal activities are described below under the heading "Basic data, techniques and problems" (paragraph 75) has been concerned with the basic scientific phenomena involved in soil erosion.

#### Inland and intra-coastal navigation

61. Inland and intra-coastal waters have always been an important means of transport and still remain for many areas and types of cargoes the most efficient and economical. The transportation possibilities of natural rivers have been vastly enhanced by a large variety of improvements such as the removal of obstructions, the dredging of the channels, the creation or improvement of harbours, the establishment of light stations and beacons as well as the forming of new waterways by constructing canals. The techniques and problems which are pertinent to this field include not only those directly connected with the development of waterways but also those which arise as a result of other works which are established on rivers such as bridges or the use of rivers for other purposes such as irrigation and power.

62. The activities of the United Nations in this field include the review by the Transport and Communications Commission of problems in the field of inland waterway transport on a world-wide basis, the publication of a quarterly Transport and Communications Review and of inland waterway traffic statistics, the provision of technical assistance, and certain regional activities organized by the Economic Commission for Asia and the Far East. Technical assistance activities have included the provision of technical advice within the framework of over-all economic development missions, the provision of individual expert advice, the awarding of fellowships, and a three month study tour of Asia, Europe and North America, arranged in conjunction with the Economic Commission for Asia and the Far East for ten experts in inland navigation from that region. In addition to the latter project, ECAFE is engaged in a continuous programme of studies and exchange of experience and publishes the Transport Bulletin quarterly.

33/ The Pacific Science Association was inaugurated by the First Pan-Pacific Scientific Conference in Honolulu in 1920 and formally organized at the Third Congress in Tokyo in 1926. Membership is open to all countries having an interest in problems of the Pacific. Of its outstanding committees, those on Meteorology, Pacific Conservation and Soil and Land Classifications are relevant to water resources. See E/2205/Add.1 for additional details.

/63. The Central

63. The Central Commission for the Navigation of the Rhine was first established in 1816 following the Congress of Vienna in 1815,<sup>34/</sup> and its functions in recent years have included: regulation of construction, including channels, bridges, piers, etc., in order to protect navigation; enactment and revision of regulations covering the police and safety of navigation; regulation of social and labour questions (in co-operation with the International Labour Office); the re-establishment, in conjunction with the Occupation Authorities, of navigation tribunals in Germany; handling of administrative questions in order to remove the administrative barriers hampering navigation in Germany and to ensure the adaptation of the prevailing regulations to requirements of the Rhine fleet; and the resumption of the publication of the annual report which the Commission has been issuing since 1835, covering all matters affecting the navigation of the Rhine, e.g., the state of the river, the works carried out, water levels, the organization of river services, etc. The Commission collaborates with the statistical services of the riparian states and of Belgium towards the progressive standardization of national statistics on inland waterways transport with a view to facilitating their comparison. The Commission maintains working relationships with the United Nations and its Economic Commission for Europe and with a number of the specialized agencies of the United Nations, and is a member of the Permanent International Association of Navigation Congresses.<sup>35/</sup>

64. The first inter-governmental body dealing with the Danube was established in 1856. The present Commission was created by a Convention which was signed at Belgrade on 18 August 1948 and came into force on 11 May 1949.<sup>36/</sup> The members of this Commission are Bulgaria, Czechoslovakia,

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<sup>34/</sup> The Commission was reconstituted in 1868 by the Treaty of Mannheim, which was modified in 1919 by the Treaty of Versailles and in 1921 and 1923 by two protocols of accession of the Netherlands. After the Second World War, the Commission, composed of delegations of Belgium, France, Great Britain, the Netherlands, Switzerland and the United States, was convened to resume its work on the basis of the Convention of Mannheim. Germany joined the Commission in 1950.

<sup>35/</sup> A fuller description of the Central Commission for the Navigation of the Rhine is contained in Transport and Communications Review, vol. II, No. 4 (October - December 1949), Department of Economic Affairs, United Nations.

<sup>36/</sup> Between 1856 and 1948 additional Conventions were signed and organizations established. These have all been superseded by the 1948 Convention.

Hungary, Romania, the Ukrainian Soviet Socialist Republic, the Union of Soviet Socialist Republics, and Yugoslavia.<sup>37/</sup> The Commission was charged with the supervision of the implementation of the provisions of the Convention; with the preparation, in consultation with the Danubian States, of a programme of major works for the improvement of navigation; with the establishment of uniform regulations, including those governing the pilot service for the navigation on the Danube, and with unifying the regulations concerning river inspection. It was also to establish Special River Administrations for the lower Danube and for the Iron Gates by agreements between the governments concerned, and to co-operate with the Special River Administrations. In addition, it is authorized to carry out the necessary works provided for in the programme of major works if a Danubian State is not able to do so itself.

65. International action with respect to maritime navigation impinges upon that related to inland and intra-coastal navigation although its scope is far wider. The Permanent International Association of Navigation Congresses was founded in 1904 to promote through exchange and publication of information the progress of internal and maritime navigation, in particular the improvement of rivers, internal and maritime canals, ports, etc., and their technical exploitation, and to consider relevant commercial and economic questions. The Association's present headquarters are in Belgium. Its membership is composed of the representatives from forty-one countries or territories, the Central Commission for the Navigation of the Rhine, the International Suez Canal Company, and of corporations and private persons. The association holds congresses every three or four years. It publishes a half-yearly technical bulletin as well as the proceedings of its congresses. The Association is at present engaged in the publication of a technical dictionary in six languages, the chapters of which are: (i) Water and Sea; (ii) Rivers, Streams and Canals; (iii) Coasts and Shores; (iv) Boats and Vessels Propulsion; (v) Materials; (vi) Constructional Matters and Equipment; (vii) Ports; (viii) Locks and Dry Docks; (ix) Fixed and Movable Bridges; (x) River Weirs; (xi) Tunnels, Siphons, Lifts and Aqueducts; (xii) Maritime Signals; (xiii) Equipment; (xiv) Staff, Administration and Operations; (xv) Foundations.

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<sup>37/</sup> Austria is to be admitted to the Commission after the settlement of the question of the Treaty with Austria.

Fish and wildlife<sup>38/</sup>

66. For most parts of the world, the vast potential resources for protein-rich food to be found or developed in coastal or inland waters have hardly been tapped, although in a few parts of the world where fishing is presently carried out on a relatively large scale such as in the waters of Northern Europe, there may be a problem of overfishing. The exchange of scientific and technical information with regard to specific techniques and species as well as guidance on practical projects appears to be one of the most fruitful areas for international co-operation and one which can contribute very substantially to economic development and the raising of living standards. The cultivation of fresh and brackish water fish, a technique which lies at the doorstep of many millions of people in tropical countries who are at present protein-starved, is one which is in its relative infancy and holds forth the promise of being one of the most important methods for increasing world food production. While fisheries were among the earliest subjects to receive international attention, they have also witnessed in recent years an increased amount of international effort, particularly that carried out and stimulated by the Food and Agriculture Organization. Somewhat related in its problems is the concern with wildlife.

67. The Food and Agriculture Organization is engaging in a continuous programme of collection and publication of statistical and technical information on fisheries and has organized training centres and training courses which include the management of inland water fisheries. It has been giving special attention to studying and promoting the culture of fish in fresh and brackish water, ponds and rice fields. It has sponsored the Indo-Pacific Fisheries Council and the Latin American Council, and is now organizing a General Fisheries Council of the Mediterranean for promoting fisheries developments in these regions through a continuing organization composed of experts from the member countries in the areas. The Food and Agriculture Organization also participated in the planning and organization

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<sup>38/</sup> The present report is primarily concerned with inland rather than maritime water resources. Inasmuch, however, as the co-operating fisheries organizations furnished a considerable amount of information on maritime fisheries and as some of this information is related to inland water fisheries, for example that relating to salmon, which migrate between inland and ocean waters, the information has been included.

of the United Nations Scientific Conference on the Conservation and Utilization of Resources, which devoted one of its six technical sections to fish and wildlife subjects.

68. In the broader field of wildlife, with the support of UNESCO, the International Union for the Protection of Nature functions to (1) encourage and facilitate co-operation between governments and national organizations concerned with, and persons interested in, the protection of nature; (2) promote and recommend national and international action with respect to (a) the preservation in all parts of the world of wildlife and natural environment, soils, water and forests, including the protection of sanctuaries, by appropriate legislation, with special regard to the preservation of species threatened with extinction, (b) the spread of public knowledge and education in this field, (c) the preparation of international agreements, and (d) scientific research; and (3) collect, analyze and disseminate information concerning the protection of nature. One problem being considered in 1952 is "Water, an Essential Factor in the Protection of Nature."<sup>39/</sup>

69. Fishery problems of the North Atlantic gave rise to the International Council for the Exploration of the Sea, organized for the purpose of promoting concerted biological and hydrological investigations for the rational exploitation of the North Atlantic, including North European waters.<sup>40/</sup> Through area and scientific committees, the Council deals with hydrography, with plankton, herring, salmon and trout, and with whaling, and publishes statistics on these subjects. It also publishes Annales Biologiques and Plankton Identification Sheets. Co-operation is maintained with the Food and Agriculture Organization. The Council also co-operates with the International Union for Geodesy and Geophysics and the International Whaling Commission. Fishery problems of the Mediterranean Sea are considered by the International Commission for Scientific Exploration of the Mediterranean Sea. The functions of this organization include the study of the hydrography, hydrology and marine biology of the Mediterranean with a view to the

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<sup>39/</sup> The International Union for the Protection of Nature is the successor of several organizations dating as far back as 1910. It was established in 1948 at a conference convened jointly by UNESCO and the French Government, in which delegates from thirty-three countries participated.

<sup>40/</sup> This organization was founded in Copenhagen in 1902. Its present membership is comprised of twelve European countries.

exploitation of its marine resources and the promotion of the fisheries industries connected therewith.<sup>41/</sup> As regards the Northern Pacific, fishery problems of common concern to Canada and the United States are handled through the International Fisheries Commission established in 1923. To protect the halibut fisheries of the North Pacific and the Bering Sea, the Commission regulates the halibut fisheries and conducts statistical and biological investigations to guide such regulation. Another organization, the International Pacific Salmon Fisheries Commission, established in 1937, is concerned with the protection, preservation and extension of the sockeye salmon fisheries of the Fraser River system and studies all phases of the life cycle of the sockeyes and the effect on their abundance of commercial and Indian fisheries, pollution, obstructions, and water-use projects with a view to making recommendations to the Governments of Canada and the United States.

70. On a world-wide basis, the International Whaling Commission was established pursuant to the International Convention for Regulation of Whaling of 1946. The Commission, composed of representatives from Australia, Brazil, Canada, Denmark, France, Iceland, Japan, Mexico, Netherlands, New Zealand, Norway, Panama, South Africa, Sweden, USSR, the United States and the United Kingdom convened its first meeting in London in June, 1949. The Commission's main objective is to ensure proper conservation and development of whale stocks. Perhaps the most important power possessed by the Commission is that which enables it to amend from time to time the regulations contained in the Convention which deal with such matters as protected and unprotected species, open and closed seasons, open and closed waters, etc.

#### Basic data, techniques and problems

71. Basic data on the quantity and quality of water are essential for all types of application or control, although particular types may require additional specialized data. Such basic data comprises essentially an inventory of the resource and are required not only for specific applications, but for planning the optimum use of the resources of a given area, determining the various potential applications and establishing a proper balance between them.

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<sup>41/</sup> This organization was founded in 1919; it was dormant during the period from 1938 to 1950.

While the collection of such data is essentially a local or national project, it must be carried out ~~against~~ a background of knowledge not only of the various uses to which such data can be put, but also of the factors which affect the appearance of water resources in the various phases of the hydrological cycle. (the continuing process under which moisture is precipitated from the atmosphere in the form of rain, snow or dew and returned to the atmosphere by evaporation from land or water surfaces or by transpiration from plant life). Special techniques of measurement and evaluations are involved. The variability of precipitation, of stream flow and of ground water introduces complexities since measurements are required over a considerable period of time. The analysis and interpretation of such measurements are facilitated not only by statistical techniques but also by discovery of various technical relationships such as the relationship between precipitation and run-off, which takes into account the influence of such factors as soil permeability and temperature. Broader economic and social data are, of course, also essential as they reflect needs and influence desirability of particular applications. The concern of the present review is with the activities of international organizations which are devoted to the exchange of experience and information regarding the collection and interpretation of such basic data of both a technical and economic character. In addition to the question of basic data, there are also certain techniques such as those concerned with water structures and certain specialized fields of knowledge, such as hydraulics, which are common to the various types of water use and control; activities concerning these are also reviewed.

72. Many organizations whose activities have already been reviewed in relation to specific fields of water utilization or control, such as power, flood control, etc., are active in the development of basic data and techniques, at least as these affect their field of interest. In addition a number of international organizations have as their primary purpose the development and exchange of information regarding basic data and techniques. These include the World Meteorological Organization, the International Association of Hydrology, the International Association of Meteorology, the International Association for Hydraulic Research, and the International Commission on Large Dams, an affiliate of the World Power Conference.

/73. The United

73. The United Nations has been carrying on activities of this type incidental to a number of programmes which have already been reported. Its Scientific Conference on the Conservation and Utilization of Resources devoted considerable attention to questions of water-resource appraisal and basic techniques. Member governments of the United Nations are being assisted in their appraisal of water resources through the advice of experts and through the support of fellowships.<sup>42/</sup> In addition the Bureau of Flood Control of the Economic Commission for Asia and the Far East is assembling and publishing basic data on major rivers in the region and is also promoting standardized terminology, records and methods of measurement. The compilation by the United Nations of basic statistics relating to various utilization and control aspects have been noted under specified fields such as energy production, inland navigation, etc. UNESCO, through its arid zone research programme, is also promoting basic scientific work in hydrology and is serving as a clearing-house for existing studies. Also relevant is the work of the Food and Agriculture Organization on the appraisal, classification and mapping of land and water resources in individual countries, as well as its preparation currently of a world map of international river basins.

74. As already noted, the World Meteorological Organization serves to ensure a very substantial degree of international co-operation both as to basic data and techniques, particularly as they affect the interpretation and prediction of weather. This co-operation takes place at the inter-governmental level. As yet there exists no parallel systematic world-wide effort with regard to the assembling of basic data for the appraisal of surface and ground waters, although considerable progress on a regional basis is being made as a result of the work of the Bureau of Flood Control of the Economic Commission for Asia and the Far East. The need for international co-operation in promoting the survey and appraisal of resources, including water resources, was recognized by the Economic and Social Council in considering resolution 345 A which was adopted at its twelfth session.<sup>43/</sup>

<sup>42/</sup> For example, the United Nations is assisting Afghanistan in the establishment of a national agency to be concerned with the survey and appraisal of surface and underground water and in helping to organize such a survey and appraisal.

<sup>43/</sup> In resolution 345 A (XII) the Council requested the Secretary-General "to initiate a programme designed to promote the systematic survey and inventory of non-agricultural natural resources", including the development of international standards and the compilation of basic data on inventories. The Secretary-General reported to the thirteenth session of the Council (E/2038) that the needs for activity with respect to water resources under resolution 345 (XII) could best be clarified following the preparation of the report presented herewith.



75. Operating at the level of individual specialists and their national organizations are the International Association of Meteorology and International Association of Hydrology; both are constituent bodies of the International Union of Geodesy and Geophysics which was founded in 1919 and whose current membership includes individuals and groups from forty-six countries. Both meet concurrently with the General Assembly of the Union, which is approximately every three years. The two organizations are financed by the International Union and also receive subventions from UNESCO. The International Association of Hydrology considers basic scientific aspects of surface waters, snow and glaciers, subterranean waters and continental erosion. Subjects currently dealt with by the Association include hydrology of floods, conditions which influence snow and ice cover, arid zones, measurement of precipitation, hydrologic characteristics of run-off, inventory of run-off, and general study of instruments employed in hydrology. A Classification of Snow and Ice adopted in 1951 by the Association; under the Association's direction, nations publish a continuous hydrological bibliography, also the Association is compiling a dictionary of hydrology in six languages.<sup>44/</sup> The Pacific Science Association and the Caribbean Commission are also active in the promotion of basic meteorological work in their areas, the latter co-operating closely with the World Meteorological Organization.

#### Hydraulic structures and specialized equipment

76. It is to be noted that various organizations, in connexion with specific fields of utilization and control - water supply, power, navigation, irrigation, drainage and fishing - are concerned with structures and equipment. Technical assistance with respect to specific projects and the training of personnel is being granted by the United Nations and by the Council for Technical Co-operation in South and South-east Asia. In addition two technical organizations function primarily in this field. The International Commission on Large Dams was founded at Paris in July 1928, during a Congress of the International Union of Producers and Distributors of Electrical Energy. In 1930 the Commission became an affiliate of the World Power Conference, with full technical and financial autonomy, under its present title of International Commission on Large Dams of the World Power Conference.

<sup>44/</sup> For additional details on the Association see E/2205/Add.1.

The aims of the Commission are to encourage improvements in the design, construction, maintenance and operation of large dams. Congresses are normally held in connexion with the meetings of the World Power Conference. The Commission has published a multi-lingual dictionary on dams, with the sponsorship of UNESCO, and also publishes a Bulletin.<sup>45/</sup> In the construction of large dams and hydraulic structures many problems arise related to water movements at high velocities and other phenomena. These and other fluid flow problems are being considered at an international level by the International Association for Hydraulic Research. This organization was founded in 1935 and includes both individual and organizational membership. It organizes scientific meetings and issues an annual report on world-wide research activities.<sup>46/</sup>

#### Economic and social aspects

77. Except for organizations which limit themselves to basic scientific aspects, economic and social considerations are more or less inseparable from technical considerations in the work of the international organizations surveyed. This is markedly the case in so far as are concerned the activities of the United Nations, the Food and Agriculture Organization and, of course, the International Bank for Reconstruction and Development, for which the primary motivation in undertaking water-resources activities lies in the importance of these resources for economic development. In addition, the four inter-governmental organizations<sup>47/</sup> which deal with the regulation and development of international waters continuously deal with the economic and social aspects of all projects which are subject to their investigations and recommendations.

#### Legal and administrative aspects

78. Like economic and social aspects, but not to as important an extent, legal and administrative aspects are inherent in various of the fields

<sup>45/</sup> Ibid.,

<sup>46/</sup> For additional details on this organization see E/2205/Add.1.

<sup>47/</sup> The Central Commission for the Navigation of the Rhine, the International Danube Commission, the International Joint Commission (Canada and the United States), and the International Boundary and Water Commission (Mexico and the United States).

of activity surveyed. Noteworthy are such activities of the Food and Agriculture Organization as the compilation in 1948 of "Water Laws in the United States of America", which relates to water rights, irrigation, conservation, drainage, and flood and overflow protection for agricultural lands, and the compilation now in progress of the water laws of Italy and the Near East FAO member countries. Also, as an integral part of the development national and international programmes and policies for land and water utilization and conservation, FAO is concerned with the formation or improvement of national organizations, laws and international agreements for the development of such programmes and policies. The Economic Commission for Europe during the period 1949 to 1951 has devoted attention to the question of legal problems affecting international co-operation for hydroelectric development, and has published a survey of the international agreements arrived at throughout the world in connexion with hydroelectric development on rivers and lakes forming or crossing international boundaries. A separate legal study has been completed and recommendations to governments made regarding factors affecting transfers and exchanges of electric energy.

Summary of methods employed<sup>48/</sup>

79. One method employed by virtually all organizations is that of the international meeting where an exchange of information and experience takes place either on a regional or a larger international scale. This exchange takes place through the reading of prepared papers and a discussion either on a broad range of related topics or on pre-selected special topics. The usual subsequent publication of proceedings makes the papers and discussions available throughout the world. Most of the organizations have used special preparatory committees for this purpose and many of them have issued from time to time special reports or other publications.

80. In addition to employing this method, the United Nations and the specialized agencies have also undertaken the analysis and interpretation of

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<sup>48/</sup> For further details on methods employed, see annex D, in which the activities of the individual organizations surveyed are classified by type of activity. In addition to the methods summarized in this section, there are also the financing activities of the International Bank for Reconstruction and Development and the regulatory and investigatory activities of four inter-governmental bodies reviewed in this report.

experience in different areas and fields in the form of special studies. As for other organizations, such analytical activities have for the most part been of a minimal character since these organizations generally function with a very small secretariat, although as for example in the case of the World Power Conference, they may assemble summary data in the fields of their interest and publish these periodically.

81. The technical assistance programme employs both of the above methods but in addition provides guidance with respect to specific projects. Also, it provides for the training of experts in various specialized fields through fellowships, scholarships and training institutes. The latter represents an important means for the international transfer of experience, which has been most widely employed by national organizations, both public and private, and by individuals.

82. Only a few physical experimental or demonstration projects have been reported. UNESCO under the Arid Zone Research Programme is supporting some experimental studies through modest research grants. The World Health Organization uses the techniques of demonstration projects in combatting the disease hazards of malaria, bilharziasis and other water-borne diseases. The United Nations and the specialized agencies through the technical assistance programme provide technical guidance, and may in some cases provide equipment, to Member Governments in carrying out experimental activities.

83. As to the promotion of international technical standards, which represents an important aspect of the international exchange of experience, formal and conscious efforts, although increasing, are limited in number and scope. The World Meteorological Organization functions continuously along these lines. The International Association of Hydrology has undertaken a number of projects and the World Power Conference has advanced standards for the "rating of rivers" for power purposes. The Bureau of Flood Control of the Economic Commission for Asia and the Far East has a standards project in progress for hydrological measurements. The World Health Organization is initiating activity for the development of international standards in sanitary facilities at ports and agreements on the control of pollution of waterways.

## V. CONCLUSIONS

84. Wherever economic development activities are carried on, a substantial portion of the total effort necessarily is devoted to the use and control of water resources because of their several indispensable functions. Such water resource activities are performed preponderantly at the national and local levels, especially and necessarily where the construction of water works and the collection of basic technical, economic and social data required for these works are concerned.

85. In the present, as in the past, an important function of international activity is to bring to such national and local projects the wealth of pertinent world-wide experience which has been accumulated. The necessary international exchange of experience and information is achieved in many ways, such as the international circulation of technical literature, foreign education and travel, and the hiring of foreign experts. International organizations do more than supplement these diverse activities; they seek to place the exchange of information and experience on a more systematic basis in order to accelerate its flow from one area to another, and to provide a means for interpreting experience acquired under a diversity of conditions so that it can be most fruitfully applied. This function of providing for the international exchange and analysis of experience is one common to all the organizations covered in the present survey. A second function is that performed by the four inter-governmental bodies<sup>49/</sup> which are concerned with regulating the use of water resources shared by two or more countries. A third is that performed by the International Bank for Reconstruction and Development in providing loans for the purpose of assisting in the construction of water works or other development of water resources. With respect to all three functions the contribution of international organizations to date is a modest one.

86. With regard to the international exchange of experience and information, while it is true that under each of the specific subjects reviewed in part IV, one or more organizations were reported as carrying out some pertinent activities, these activities leave numerous gaps in both subject-matter and geographic coverage. The technical assistance programme, as has been noted

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<sup>49/</sup> See paragraphs 39, 40, 63 and 64.

/earlier,

earlier, accounts for the most important recent expansion of activities of this kind and is potentially comprehensive in both its geographic and subject-matter coverage, but by its nature the scope and character of the actual programme depend upon the specific requests of Members of the United Nations.

87. The making of analytical studies by international organizations is limited almost entirely to the United Nations and the specialized agencies. The number of studies produced thus far is small. For a number of fields there are no provisions for a continuing programme of analytical studies. Most of the organizations of an international character in this field - aside from the United Nations and the specialized agencies - have encountered difficulties in achieving adequate geographic coverage. While their charters frequently provide for universal membership, in many instances they have been unable to secure the support necessary to achieve it. This is especially true with reference to participation of under-developed areas. Thus the activities of these organizations, which centre about scientific meetings held at periodic intervals, scarcely provide for world-wide participation even in fields which are covered by continuing programmes.

88. Serious gaps in the international exchange of experience are the absence of continuing world-wide programmes with regard to basic hydrological data and to study of the integrated development of water resources. The collection and analysis of basic data has been recognized as fundamental to practical work, but to date only data relating to precipitation have been given continuing attention. The need for international co-operation in the collection of basic hydrological data, including the quantity and quality of surface and ground water, has been recognized - by individual governments in their requests for technical assistance, by FAO in relation to the effective use of water for agricultural purposes, and by the Economic and Social Council in resolution 345 (XII).<sup>50/</sup> As to multi-purpose development there is no continuing programme for studies despite the recognized importance of this subject to the more effective utilization and control of water resources and general economic development. The subject has, however, received attention on the part of a number of organizations on a regional, or smaller area, basis and has also been treated in conjunction with other subjects by a number of organizations operating

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<sup>50/</sup> See footnote 43.

/on a world-wide

on a world-wide basis. Since organizations concerned with specialized functions cannot by their terms of reference deal adequately with this subject which embraces a number of fields outside their competence, the meeting of this major deficiency in international work would appear to depend upon the establishment of a service which would bring together the interests and contributions of the component fields. Likewise the deficiency regarding the collection of basic data could be met by such a central service.

89. In the case of financing of water projects, the total of some \$225 million loaned to date by the International Bank for Reconstruction and Development, mostly for the construction of hydro-power works, although extremely important to its beneficiaries, represents but a fraction of the funds which could be employed in this field.<sup>51/</sup>

90. Similarly, it must be noted that the inter-governmental activities currently being carried out with regard to the regulation and joint development of contiguous water resources cover only a small part of the existing opportunities for such development.<sup>52/</sup>

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<sup>51/</sup> See paragraph 32. In making loans in this field, the Bank must consider in consultation with its member countries the relative merits of projects in this field and in other basic fields. The Bank also takes into consideration the technical feasibility of proposed projects in water-resource development and the bearing of the project on the borrower's credit worthiness.

<sup>52/</sup> In a review of integrated development of river basins by a group of experts at the United Nations Scientific Conference on the Conservation and Utilization of Resources, it was pointed out that major draining basins in Europe, South America, Africa and Asia cross the boundaries of several countries and that there is an important problem in international co-operation involved in the integrated development of these basins for which international provisions have not yet been made. See UNSCCUR Proceedings, volume I, Plenary Meetings (E/Conf.7/7), pages 387 to 403. The same may be said of the Rhine and Danube Rivers where the primary concern of inter-governmental organizations has been navigation. It should, however, be noted that since 1900 more than 150 bilateral and seven multilateral conventions have been concluded. While such treaties have been numerous, the establishment of permanent or temporary organizations for the regulation of contiguous waters has been rare; the four inter-governmental bodies which have been described in this report are the principal ones in existence. Where there is no joint body to supervise the utilization and conservation of the resources continuously, the same functions may be performed, at least in part, by consultation among governments and through their regular agencies.

91. In requesting the present report (resolution 346 (XII)), the Economic and Social Council has recognized "the desirability that measures being taken internationally in the general field of water control and utilization should be co-ordinated, and that such co-ordination should be undertaken within the United Nations system".

92. The need for co-ordination of activities in the general field of water resources results from the inter-relation of the various uses of water. Co-ordination measures could serve to increase the effectiveness of the limited financial and personnel resources being devoted to international work in this field by: (a) pointing out the common interests on the one hand and the duplication of work on the other, and promoting co-operation and elimination of duplication accordingly; and (b) providing a means of exchange of experience and information among international organizations in order to improve their methods of work and promote the adoption of new methods where appropriate.<sup>53/</sup> Co-ordination measures could also serve the important function of defining deficiencies in coverage, in respect both of subjects and of areas, and promoting an expansion of activities to meet the most urgent needs. The need for co-ordination measures has become more important in recent years with the expansion of work, particularly by the United Nations and the specialized agencies. If the most effective steps are to be taken to augment and strengthen further the work in this field, it is essential that there be some arrangement for the continuing examination of the international work being carried out and for pointing up the major deficiencies in such work. While the improvement of its own methods of work and the reinforcement of its activities is the province of each individual organization, through co-ordination measures each can be helped in such efforts, necessary co-operative work can be promoted, and each organization can become better aware of its own potential role in meeting existing deficiencies in the over-all pattern of international work.

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<sup>53/</sup> As noted earlier, the activities of international organizations have generally been modest compared to the large possibilities for activity and are dispersed over a wide range of fields. For this reason there has as yet been little duplication of effort. Moreover, organizations both within and outside the United Nations system have tried to be aware of one another's related interests and in a number of instances noted in the summary of activities in part IV have accordingly developed co-operative relationships.



93. As to the strengthening of the activities of the specialized agencies and the United Nations, it should be noted that each of the specialized agencies has an established specific sphere of interest and responsibility which can, however, only be implemented as far as financial and personnel resources permit in the light of the priority which may be attached to other activities. The World Meteorological Organization is the principal international organization functioning in a single specialized sphere of interest relevant to the subject of this report. With its formal affiliation with the United Nations, it has begun to participate in the technical assistance programme. It thus has a programme in this field which ranges from the establishing of standards for basic data to the provision of specific technical guidance. The interest of the Food and Agriculture Organization is fundamental because of the relation of water to agricultural production, forests and inland fisheries. It has taken considerable initiative in recommending that its members develop basic water-resource data and adequate administrative and legal machinery. It plays a leading role in developing international co-operation with respect to problems of irrigation, drainage and the water requirements generally for agricultural purposes. The World Health Organization, in its concern with environmental sanitation, has dealt with the sanitary control of water supplies and has also been concerned with the elimination of specific water-borne diseases. The United Nations Educational, Scientific and Cultural Organization, by sponsoring international unions, has promoted co-operation among international scientific and technical organizations concerned with water resources. It has also provided a mechanism for the co-ordination and promotion of scientific work related to the development of arid zones. The International Bank for Reconstruction and Development lends money in support of projects contributing to water resources development.

94. The Secretariat of the United Nations has, through its statistical work, scientific conferences, missions and studies, dealt with problems of comprehensive river-basin development, the problems of basic data and certain specialized aspects of water resources, such as water power, transport and water supplies. However, no continuing and comprehensive programme has been established other than the regional programme for Asia and the Far East. Council resolution 345 (XII) anticipates further work especially pertinent to basic data

/on water

on water resources. Additional work also may be anticipated with particular reference to under-developed areas other than those covered by the regional programme for Asia and the Far East.

95. From the foregoing it may be seen that although a substantial volume of work is being undertaken on an international basis, not only are there deficiencies in the extent to which the main aspects of this subject are covered and in the depth and amount of work devoted to particular regional problems, but there is no continuing mechanism for overseeing the entire field and for maintaining contact among the diverse and numerous organizations concerned. A liaison mechanism alone may, however, of itself not contribute importantly to the total volume of work done, although it might avoid dissipation of resources and might bring forward for special attention and action important but neglected aspects of the work. It may therefore be judged timely to consider the desirability of some general oversight and examination, both of work projected and undertaken and of work not programmed for which a real need can be seen to exist.

ANNEX A

TEXT OF CIRCULAR LETTER DATED 1 AUGUST 1951 TO INTERNATIONAL ORGANIZATIONS

The Economic and Social Council of the United Nations at its last session requested the Secretary-General to submit a report "on the work being done by the specialized agencies and other international organizations, whether governmental, semi-governmental or non-governmental, engaged in the broad field of water control and utilization".

It is believed that the report should include an appropriate reference to the activities of your organization and we would very much appreciate your co-operation in securing accurate information on which to base our study and any references which may be made to your organization.

We would be grateful, therefore, if you could submit to us a statement, organized along the lines set forth in the enclosed outline, covering your activities in the field of water control and utilization. This, together with the statements of other co-operating organizations, would serve as the basis for the summary report in which all the international activities would be described within a common framework.

We contemplate that the summary report will be ready in preliminary form in early 1952. In order to make effective use of your statement, we would need to receive it, together with supporting documentation, not later than 1 November 1951. We plan to circulate the preliminary draft to the co-operating organizations for review in order to ensure the accuracy of the final draft to be submitted to the Economic and Social Council.

In preparing the statement, you may wish to take into account the possibility that the statements of individual organizations may be included as an annex to the report. The decision as to whether such an annex will be presented will be made, however, only after all the available individual statements have been received and reviewed.

We would appreciate being informed whether your organization will be able to co-operate and when we may expect to receive material from your organization.

/OUTLINE

OUTLINE TO BE FOLLOWED BY INTERNATIONAL ORGANIZATIONS CO-OPERATING IN  
THE PREPARATION OF THE UNITED NATIONS REPORT ON INTERNATIONAL  
ACTIVITIES IN THE FIELD OF WATER CONTROL AND UTILIZATION

I. General Character and Activities of the Organization

- |  |   |
|--|---|
| 1. Origin and purposes   | 5. Geographic area of activity            |
| 2. Membership  | 6. Budget and methods of financing        |
| 3. Organizational structure  | 7. Relationships with other organizations |
| 4. Principal activities (including general programme of work for 1950-51-52) |   |

Replies to Items 4, 5, 6 and 7 should include very brief summary information concerning water activities as well as other major programmes of the organization. Replies to Items 3 and 4 should include information to show how water activities are related to the organization's major functions and purposes.

It is anticipated that the organization has published reports or memoranda available covering the majority of these topics. To the extent that such material is up to date and adequate, it would be satisfactory in lieu of a specially prepared statement.

II. Information on Individual Projects in the Field of Water Control and Utilization

For the years 1950-51-52, there should be furnished, for each important project, the following information:

Note: If there are no formal projects as such the organization should describe its activities using the points listed below and being guided by the outlines given in Annexes A and B in breaking down its activities.

1. Nature of the project - subject matter, type of activity, and geographic coverage. (The organization can facilitate the preparation of the overall report by taking into account the classifications and distinctions which follow).
2. Time schedule and priority in the general programme of the organization.
3. Internal staff (number, type, and estimated total man-years).
4. Outside experts (number, type and international composition).
5. Estimated cost of the project, broken down by such major cost categories as may be available.

6. Expected benefits of the project.
7. The manner in which, if appropriate, the project is co-ordinated with activities of other organizations.
8. Publications resulting from the project.

Documentation

The organization may find it possible to furnish an adequate description of a project by providing, with any necessary explanations, certain of its publications. In any event, it is desirable that the organization furnish, to the extent available; all publications relevant to its activities in the field of water resources, as these will be valuable in preparing the over-all report.

## SUBJECT-MATTER CLASSIFICATIONS

In the preparation by the United Nations Secretariat of the report summarizing the activities of the various organizations, the broad classifications given below will be employed to group the projects reported:

### A. Classifications by End Use

(These classifications will be employed for activities which are directed to particular end uses).

1. Comprehensive development and use of a water resource
2. Industrial and domestic water supply
3. Energy production
4. Irrigation
5. Drainage and reclamation
6. Flood control
7. Control of soil erosion and watershed protection
8. Inland and Intra-coastal navigation
9. Fish and wildlife
10. Recreation
11. Other

### B. Basic Data, Techniques and Problems

(These classifications will be employed for activities which are not directed primarily to particular end uses).

1. Meteorology, hydrology, geology, hydraulics, and the appraisal of water resources
2. Hydraulic structures
3. Economic and social aspects
4. Legal and administrative aspects
5. Fluvial morphology (including silting)
6. Pollution
7. Purification or use of salt and brackish waters
8. Special techniques of storage
9. Artificial precipitation
10. Other

### C. Classifications by Special Area or Region

(These classifications will be employed for the additional listing (cross-reference) of activities already described under the classifications given in items A and B where such activities are directed to particular types of areas such as arid zones or to particular geographic regions).

## TYPES OF ACTIVITY CLASSIFICATIONS

It is expected that the following categories will be employed in distinguishing different types of activities in the over-all report:

- (i) Collection and publication of basic data - technical, economic and social
- (ii) Research
  - (a) Analytical studies of a technical, economic, social, or legal character
  - (b) Basic scientific research, including experimental studies
  - (c) The exploration of important problems through meetings of experts and symposia, including the solicitation of original papers as part of the regular conference programme
- (iii) Demonstration projects
- (iv) Educational activities and the dissemination and exchange of information, through conferences, seminars, training institutes, fellowships, and publications
- (v) Planning, execution, or operation of projects for water control and use
- (vi) Specific technical guidance to governments or national organizations in organizing activities such as (i) to (v), above, on a national or local basis
- (vii) Consultative facilities for the development of:
  - (a) international technical standards
  - (b) other international agreements
  - (c) domestic legislation

ANNEX B

LIST OF THE INTERNATIONAL ORGANIZATIONS SURVEYED WITH  
INDEX OF REFERENCES TO THEM IN THE REPORT 1/

<u>Name of organization</u>	<u>Reference (paragraph number)</u>	
	<u>Text</u>	<u>Annex D</u>
United Nations and specialized agencies	1,2,3,4,5,19,20,21,22, 36,56,60,80,82,87,92,93	
United Nations . . . . .	16,23,24,25,26,27,28,36, 37,41,47,48,50,56,62,67, 73,74,76,77,83,88,90,91, 92,93,94	1,2a,2b,2c, 3,4,6,7a,7b
Food and Agriculture Organization of the United Nations. . . . .	22,29,36,42,52,53,55,57, 59,60,67,69,73,77,78,88, 93	1,2a,2c,4, 6,7b,7c
International Bank for Recon- struction and Development. . .	20,22,32,36,48,53,57,77, 79,85,89	2a
United Nations Educational, Scientific and Cultural Organization . . . . .	3,22,29,30,50,53,54,59, 60,68,73,75,76,82,93	2b,2c,4,6
World Health Organization. . . .	22,31,34,42,53,60,82,83 93	2c,3,4,6,7a
World Meteorological Organization	16,20,22,28,60,72,74,75, 83,93	1,2b,4,6,7a
Other organizations:		
Caribbean Commission . . . . .	20,75	2a
Central Commission for the Navigation of the Rhine. . . .	63,65,77,79,85	1,2a,5b,7b
Council for Technical Co-operation in South and South East Asia .	20,37,49,53,57,76	4,6
Engineers Joint Council	34	

1/ In the case of a number of organizations, additional information in the form of individual statements by the organizations themselves is contained in addendum 1 to this report. See Annex C for list of these organizations.



## ANNEX B (Continued)

<u>Name of organization</u>	<u>Reference (paragraph number)</u>	
	<u>Text</u>	<u>Annex D</u>
Other organizations (continued):		
Inter-American Association of Sanitary Engineering . . . . .	44	2c, 7a
Inter-American Council of Commerce and Production. . . . .	38	2a
Inter-American Municipal Organization . . . . .	45	2c
International Association for Hydraulic Research . . . . .	58, 72, 76	2c, 7a
International Association of Hydrology, of the International Union of Geodesy and Geophysics	20, 58, 60, 72, 75, 83	1, 2b, 2c, 7a
International Association of Meteorology of the International Union of Geodesy and Geophysics	72, 75	
International Boundary and Water Commission . . . . .	40, 49, 53, 57, 77, 79, 85	2a, 5, 6, 7b
International Commission for the Scientific Exploration of the Mediterranean Sea. . . . .	69	
International Commission on Irrigation and Drainage. . . . .	20, 54	1, 2a, 2c, 7a
International Commission on Large Dams, of the World Power Conference . . . . .	54, 72, 76	1, 2a, 7a
International Commission of Rural Engineering. . . . .	55, 58	2c
International Council for the Exploration of the Sea . . . . .	69	1, 7b
International Danube Commission	64, 77, 79, 85	1, 2a, 5, 6, 7b

/International

ANNEX B (Continued)

<u>Name of organization</u>	<u>Reference (Paragraph number)</u>	
	<u>Text</u>	<u>Annex D</u>
Other organizations (continued)		
International Fisheries Commission	69	1,7b
International Geographical Union	20,60	1,4
International Joint Commission	39,40,49,53,57,77,79,85	2a,6,7b
International Pacific Salmon Fisheries Commission . . . . .	69	1,7b
International Society of Soil Science . . . . .	55,58	2c
International Union of Local Authorities . . . . .	45	2c
International Union of Producers and Distributors of Electric Energy . . . . .	51,76	1
International Union for the Protection of Nature . . . . .	68	2b,7b
International Whaling Commission	69,70	1,7b
International Water Supply Association . . . . .	20,43	2c,7a,7c
National Association of Manufacturers . . . . .	34	
Organization for European Economic Cooperation . . . . .	20,49	
Pan American Sanitary Organization	42,44	4
Pacific Science Association	60,58,75	2b
Permanent International Association of Navigation Congresses . . . . .	63,65	1,2b,2c,7a
World Power Conference	20,50,51,54,72,76,80,83	1,2b,2c,7a

/Additional

ANNEX B (Continued)

Additional organizations circularized<sup>2/</sup>

American Society of Agricultural Sciences, Asian Relations Organization, Baltic and International Maritime Conference, Carnegie Endowment for International Peace, Comité Permanent des Congres techniques arabes, Committee for Economic Development, Commonwealth Agricultural Bureaux, European Confederation of Agriculture, Indian Council of World Affairs, Institution of Electrical Engineers, Inter-American Statistical Institute, International Air Transport Association, International Association of Geodesy, International Association of Terrestrial Magnetism and Electricity, of the International Union of Geodesy and Geophysics, International Association of Soil Mechanics and Foundation Engineering, International Boundary Commission, International Chamber of Commerce, International Chamber of Shipping, International Commission of Agriculture Engineering, International Commission of Agricultural Industries, International Confederation of Agricultural Engineers and Technicians, International Conference of Agricultural Economists, International Conference on Large Electric Systems, International Conference of Research and Testing Laboratories for Materials and Structures, International Economic Association, International Electrotechnical Commission, International Federation of Agricultural Producers, International Federation of Housing and Town Planning, International Federation of National Associations of Engineers, International Federation of Surveyors, International Geological Congress, International Hydrographic Bureau, International Institute of Administrative Sciences, International Institute of the Hylean Amazon, International Law Association, International Maritime Committee, International Organization for Standardization, International Shipping Federation, International Statistical Institute, International Union of Agronomical Sciences, International Union of Forest Research Organizations, International Union of Pure and Applied Chemistry, International Union of Pure and Applied Physics, International Union of Theoretical and Applied Mechanics, Pan-American Institute of Geography and History, Pan-American Institute of Mining, Engineering and Geology, Pan-American Union of Engineering Societies, World Engineering Conference, World Federation of United Nations Associations.

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<sup>2/</sup> These organizations either reported no pertinent activities or failed to respond.

ANNEX C

LIST OF ORGANIZATIONS FOR WHICH STATEMENTS OF ACTIVITY ARE  
REPRODUCED IN E/2205/Add.1

United Nations:

United Nations Scientific Conference on the Conservation and  
Utilization of Resources

United Nations programme of technical assistance

Economic Commission for Asia and the Far East (including the Bureau  
of Flood Control)

Economic Commission for Europe

Specialized Agencies:

Food and Agriculture Organization of the United Nations

International Bank for Reconstruction and Development

United Nations Educational, Scientific and Cultural Organization

World Health Organization

World Meteorological Organization

Other Organizations:

Inter-American Association of Sanitary Engineering

International Association for Hydraulic Research

International Association of Hydrology

International Boundary and Water Commission

International Commission on Irrigation and Drainage

International Commission on Large Dams (of the World Power Conference)

International Geographical Union

International Joint Commission

International Water Supply Association

Pacific Science Association

World Power Conference

ANNEX D

SUMMARY OF ACTIVITIES BY TYPES<sup>1/</sup>

1. Collection and publication of basic data - technical, economic and social

United Nations: Assists governments in the publication of the International One Millionth Map of the World; publishes statistics on installed capacities and output of hydro-electric power and on inland waterway traffic.

Economic Commission for Asia and the Far East: Provides clearing-house service and publishes technical information for ECAFE region on flood control and water resources development - in the Flood Control Journal, the Flood Control Series and the Economic Survey of Asia and the Far East.

World Meteorological Organization: Is concerned with the measurement, appraisal and statistical elaboration of water evaporated and precipitated upon the earth's surface; is considering publishing condensed statistics of basic meteorological data in either tabular or chart form; is considering publication of world climatological statistics of the surface and upper air.

Food and Agriculture Organization: Is making a world-wide survey of the incidence of soil erosion; collects and analyzes information for the purpose of appraisal, classification and mapping of land and water resources for agricultural production in individual countries; is preparing a world map of international river basins.

Central Commission for the Navigation of the Rhine: Publishes an annual report on the state of navigation on the Rhine River, providing complete information on all matters affecting navigation, e.g., the state of the river, the works carried out, water levels, the organization of river services, statistics on traffic of goods and vessels, navigation tribunals, reports, etc.

International Association of Hydrology: Arranges for the publication of hydrological bibliographies.

International Commission on Irrigation and Drainage: Has prepared a questionnaire for the collection of comprehensive information regarding the development of techniques and practices in irrigation and drainage engineering, including the economic and social aspects; later will publish an authoritative treatise.

International Commission on Large Dams of the World Power Conference: Has published a technical, illustrated dictionary of dams in several languages.

International Council for the Exploration of the Sea: Collects biological data and prepares statistics to guide regulation and rational exploitation of the fisheries.

<sup>1/</sup> This summary covers the pertinent activities of all organizations surveyed. The classifications employed are those listed in annex A.

International Danube Commission: Publishes a hydrological bulletin and short and long-term hydrological forecasts; also prepares statistics on aspects of navigation on the Danube, and publishes reference works, charts, etc.

International Fisheries Commission: Collects biological data and prepares statistics to guide regulation and rational exploitation of the fisheries.

International Geographical Union: At present is working on a bibliography of the distribution of soil erosion in the world, and on a series of comparable maps on erosion; prepared for UNESCO a number of homoclimatic maps showing the world distribution of arid and semi-arid homoclimates.

International Pacific Salmon Fisheries Commission: Collects biological data and prepares statistics to guide regulation and rational exploitation of the fisheries.

International Union of Producers and Distributors of Electric Energy: Publishes periodically international statistics on the production and consumption of electricity.

International Whaling Commission: Collects biological data and prepares statistics to guide regulation and rational exploitation of whale stocks.

Permanent International Association of Navigation Congresses: Is publishing a technical illustrated dictionary in six languages.

World Power Conference: Prepares on a uniform basis and publishes data on fuel and power resources and annual statistics on the production, consumption, etc., of all forms of energy.

## 2. Research

### (a) Analytical studies of a technical, economic, social, or legal character:

United Nations: Prepares analytical studies in cartography (e.g., geological and hydrological mapping); is making a study on energy resources including a study of the relationship of hydro-electric power to comprehensive river development; makes studies on inland navigation for publication in the Transport and Communications Review, and other studies on this subject in co-operation with the regional commissions.

Economic Commission for Asia and the Far East: Prepares studies on the following subjects: improvement of flood-control methods; investigation and promotion of multiple-purpose development; comprehensive development and use of water resources; bank protection and river training; power projects and organizational problems; and co-ordinated development of hydro and thermal power.

Economic Commission for Europe: Studies the following: legal problems affecting international co-operation for hydro-electric development; comparative costs of construction of water-power plant in different countries; economics of daily pumped storage, and rural electrification.

/Food

Food and Agriculture Organization: The following studies have been or will be prepared: Soil Conservation - An International Study (a publication); Control of Salty Lands (a publication); Essential Considerations in Irrigation Development (a working paper); Limitations of Geophysical Methods (a working paper); Methods of Soil Mapping and Classification (in preparation); Essential Considerations for Development of Underground Water Resources (in preparation); Water Laws of the U.S.A. (a publication); Water Laws of Italy (in preparation); Water Laws of Near East Countries (in preparation); A World-Wide Survey of Incidence of Soil Erosion (in preparation); Appraisal and Classification and Mapping of Land and Water Resources - National and International (in preparation); also contributed various papers to UNSCCUR and other Conferences.

International Bank for Reconstruction and Development: Makes studies for internal use on the specific projects financed; reports of technical assistance missions to Colombia, Cuba, Guatemala, Iraq, Turkey and Uruguay have been published; and reports of missions to other countries, including Ceylon, Surinam, Jamaica, and Chile, are in preparation.

Central Commission for the Navigation of the Rhine: Examines and studies numerous water projects proposed which may affect navigation.

Caribbean Commission: Sponsored such analytical studies as "Survey of Water Supplies in the Caribbean" and "Water Control".

Inter-American Council of Commerce and Production: Sponsored an analytical study entitled, "Utilization of International Rivers for the Production of Hydro-Electric Power and Other Industrial and Agricultural Ends".

International Boundary and Water Commission (USA/Mexico): Makes studies and investigations of proposed water projects, whether for the solution of sanitation problems, irrigation, flood control, reclamation, navigation, etc.

International Commission on Irrigation and Drainage: Will prepare an authoritative treatise on the basis of a questionnaire which has been worked out for the collection of comprehensive information regarding the techniques and practice of irrigation and drainage engineering, including economic and social aspects.

International Danube Commission: Examines and studies numerous water projects proposed relative to navigation.

International Joint Commission (USA/Canada): Makes studies and investigations of proposed water projects, whether for the solution of sanitation problems, irrigation, flood control, reclamation, navigation, etc.

(b) Basic scientific research including experimental studies

Economic Commission for Asia and the Far East: Is performing research on the silt problem; also is co-ordinating research in hydraulic research laboratories of the region.

World Meteorological Organization: Promotes scientific research through its eight technical commissions.

United Nations Educational, Scientific and Cultural Organization: Promotes research in connexion with Arid Zone Programme, on hydrology and hydrogeology; also sponsored the preparation of homoclimatic maps.

International Association of Hydrology: Initiates and co-ordinates research in respect of surface waters, snow and glaciers, subterranean waters and land erosion.

International Union for the Protection of Nature: Co-operated with UNESCO's work on the ecology of the Sahara Desert.

Pacific Science Association: Promotes research through its Standing Committees, of which those on Meteorology, Pacific Conservation and Soil and Land Classification are pertinent.

Permanent International Association of Navigation Congresses: Promotes extensive study of the force of waves.

World Power Conference: Promoted extensive study of the velocity of water in conduits and Chezy's formula.

- (c) The exploration of important problems through meetings of experts and symposia, including the solicitation of original papers as part of the regular conference programme

United Nations: The Scientific Conference on Conservation and Utilization of Resources was held at Lake Success, 17 August - 16 September 1949.

Economic Commission for Asia and the Far East: Regional Technical Conference on Flood Control was held at New Delhi in January 1951 and a Regional Conference on Water Resource Development is scheduled to be held in 1953.

Food and Agriculture Organization: Held the Regional Meeting on Land Utilization in Tropical Areas in September 1951; will hold an international meeting on improved irrigation and drainage practices in 1953; a Latin American meeting on land and water utilization and conservation programmes and policies is proposed for 1952 or 1953; a special meeting of technical experts on torrent control is proposed to be convened in 1952.

World Health Organization: Has Standing Expert Committees on Malaria, Bilharziasis and Environmental Sanitation.

/United Nations



United Nations Educational, Scientific and Cultural Organization: In connexion with Arid Zone Programme, a symposium on hydrology will be held in April 1952 in Turkey; a four-day study trip in the Sahara was held in April 1951 in connexion with a symposium on effects of wind, evaporation phenomena and surface hydrology organized by the Centre National de la Recherche Scientifique (France).

The following are the other organizations covered in the survey which use the conference method: Inter-American Association of Sanitary Engineering; Inter-American Municipal Organization; International Association for Hydraulic Research; International Association of Hydrology; International Commission on Irrigation and Drainage; International Commission on Large Dams of the World Power Conference; International Commission of Rural Engineering; International Society of Soil Science; International Union of Local Authorities; International Water Supply Association; Permanent International Association of Navigation Congresses; and the World Power Conference.

### 3. Demonstration projects

United Nations: A joint ECAFE Technical Assistance Administration pilot project is proposed covering craft and their operation.

World Health Organization: Demonstration teams are dispatched to various countries in connexion with programmes on malaria control, biharziasis control and environmental sanitation.

### 4. Educational activities and the dissemination and exchange of information, through conferences, seminars, training institutes, fellowships, and publications

United Nations: UNSCCUR Proceedings are being published; publishes the Transport and Communications Review; publishes such statistics as are available on inland navigation; and publishes World Cartography.

Under United Nations Technical Assistance: As at the end of 1951 forty-six fellowships had been granted to persons from twenty-one under-developed countries for study in the field of water control and utilization; a three-months' tour of Asia, Europe and North America by a group of inland water transport experts was arranged; in co-operation with FAO and the International Bank three training centres were conducted on the Economic Appraisal of Development Projects - in 1950 at Lahore, Pakistan, in 1951 at Ankara, Turkey, and, also in 1951 at Santiago, Chile (subjects included irrigation, drainage, combined river development, hydro-electric development and other water utilization projects); consideration is being given to an ECAFE proposal to hold a training centre in the ECAFE region for training in water-resource development; a distribution in the ECAFE region of books on flood control was made jointly with ECAFE; consideration is being given to a proposal that there be organized a travelling exhibit of the latest geological instruments, including those employed in the search for water.

/Economic Commission

Economic Commission for Asia and the Far East: Held the Regional Technical Conference on Flood Control in January 1951; an Asian Training Centre for Water Resources Development is proposed to be convened in 1952; publishes the quarterly Transport Bulletin; also publishes the Flood Control Series, the Flood Control Journal, and the Proceedings of Regional Technical Conferences; jointly with the Technical Assistance Administration disseminated books on flood control.

Economic Commission for Europe: Publishes a survey of the international agreements arrived at throughout the world in connexion with hydro-electric development on rivers and lakes forming or crossing international boundaries.

World Meteorological Organization: Provides information on international activities in meteorology by publishing periodic bulletins and through the press and radio; will also publish technical regulations, and may publish condensed statistics on basic data; is also considering establishment of an International Meteorological Institute, and the granting of fellowships.

Food and Agriculture Organization: Publishes a number of analytical studies (see 2(a) above); also convenes numerous meetings and conferences not only for exploration of important problems by experts (see 2(c) above) but, also for exchange of information; in addition, organizes training centres and courses; three of these, one each in the Far East, Latin America and in the Middle East, have included courses on project development; two training centres on efficient use of water in agriculture may be held in 1952.

United Nations Educational, Scientific and Cultural Organization: The results of the research and studies made in connexion with the Arid Zone Programme are published; eight review reports on hydrological research in various arid and semi-arid regions of the world will be published in 1952; proceedings of the symposium on arid zone hydrology will be published in 1952; UNESCO also grants subventions to organizations for publications inter alia on questions of water use and control; several fellowships have been awarded in connexion with arid zone research; the Fundamental Education Regional Centre for Latin America, opened in May 1951, studies inter alia soil erosion and aridity; also the Fundamental Education Mission to the Middle East deals inter alia with problems of irrigated areas.

World Health Organization: Promotes and assists centres for training of medical personnel and sanitary engineers; promotes exchange of information on sanitation through conferences and seminars and awards fellowships for the training of sanitation personnel, with candidates selected from each of the six regions of the world into which WHO's work is divided; issues numerous publications including the Bulletin of the World Health Organization (quarterly), the Monograph Series, the Technical Report Series, etc.

Council for Technical Co-operation in South and South-East Asia: Arranges facilities for the training of persons from its area of operation in other parts of the world in the planning and execution of irrigation and water-supply projects, in hydrographic surveying, in the design, construction and operation of dams, hydro electric power stations and water conservation schemes, etc.

International Geographical Union: Has been considering a plan to bring a large contingent of European scholars to Washington by means of locally raised grants-in-aid, the award of travelling and teaching fellowships and exchange lectureships.

Pan-American Sanitary Organization: Has been carrying out educational activities in the form of fellowships and publications in the field of water control and is now planning courses for water plants' operators in several Latin American countries under the expanded technical assistance programme.

5. Planning, execution, or operation of projects for water control and use

Central Commission for the Navigation of the Rhine: Controls and plans projects in order to prevent hindrances to navigation.

International Boundary and Water Commission: Plans, executes and operates certain projects for various water uses.

International Danube Commission: Plans and executes certain projects for navigation.

6. Specific technical guidance to governments or national organizations in organizing activities such as 1 to 5 above on a national or local basis

United Nations: Under the technical assistance programme, the services of experts, teams of experts or missions have been requested by eighteen countries in respect of various phases of water-control activity, and work is under way in respect of twelve of the requests.

Economic Commission for Asia and the Far East: Technical guidance is given to national organizations of the ECAFE region in planning and/or execution of multiple-purpose projects, flood control, navigation, etc.

World Meteorological Organization: Technical advice, on request, to Members and other States, within certain limits, is available; WMO has also expressed its desire to participate in the United Nations expanded technical assistance programme.

Food and Agriculture Organization: Engages in such work as part of the direct advisory assistance to member governments, and under the expanded technical assistance programme; under the former, FAO Headquarters have four officers dealing with water problems in relation to land Headquarters have four officers dealing with water problems in relation to land use, four other officers dealing with soil and land problems associated with water use, and a biologist specializing in the management of inland waters and the breeding of fresh and brackish water fishes; under the latter there are eighty-five experts in thirty-two different countries under signed or anticipated agreements for 1951/52.

United Nations Educational, Scientific and Cultural Organization: Is accumulating through the Arid Zone Programme facilities for the provision, on request, of advisory services on arid zone problems; under the expanded technical assistance programme, UNESCO has approved projects connected with water control

/and

and utilization of a total cost of approximately \$300,000 in respect of five countries (experts are being dispatched or recruited and equipment is being purchased).

World Health Organization: (1) In 1951 two advisers on environmental sanitation were assigned to each of the six regions to give advice on health programmes, including health demonstration area projects which are under development in the region; the services of these advisers were available to governments, institutions, and other recognized bodies upon request; (2) in the regular malaria programme for 1951 advisers and consultants were provided as follows: Europe - one consultant for two months; Africa - one regional adviser; Eastern Mediterranean - one regional adviser; South-East Asia - one regional adviser; Western Pacific - one regional adviser, and two consultants, the latter for a period of two months only to give advice to Governments requesting assistance; the Americas - one regional adviser; additional consultants were assigned to the various regions under the expanded technical assistance programme; (3) in the bilharziasis programme provision was made in 1951 for consultants, demonstration teams and equipment as follows: one bilharziasis unit and the necessary equipment and assistance to a centre where bilharziasis workers will be trained, was provided for each of the following regions: Africa, Eastern Mediterranean, Western Pacific, and the Americas; twelve consultant months for bilharziasis and other communicable diseases were provided under the regular programme, and seventy consultant months were provided for bilharziasis and other communicable diseases under the expanded technical assistance programme.

International Bank for Reconstruction and Development: At the request of Member Governments the Bank organizes general survey missions in specific fields and sends experts from its staff or from outside the Bank to study and discuss with government officials national development programmes and projects, including the utilization of water resources; frequently the Bank gives its member countries technical assistance in connexion with the assessment of proposed loans or in the effective carrying out of projects for which loans have been made.

The following are the other international organizations which provide technical guidance to Governments or national organizations: International Boundary and Water Commission; International Danube Commission; Central Commission for the Navigation of the Rhine, and Council for Technical Co-operation in South and South-East Asia.

7. Consultative facilities for the development of:

(a) International technical standards

United Nations: International standards for cartography are being studied.

Economic Commission for Asia and the Far East: Has in progress a project on the standardization of terminology, records and methods of hydrological measurement.

Economic Commission for Europe: Has in progress an investigation of water-power resources of Europe, involving the development of operational definitions, and uniform survey techniques.

World Meteorological Organization: Will publish the WMO technical regulations using, as far as possible, the technical resolutions of the former IMO as the nucleus of the new work; supports such technical work as it considers necessary for the standardization of instruments internationally used in meteorological networks.

World Health Organization: In 1951 provision was made for "the development of international standards in sanitary facilities at ports and agreements on the control of pollution of waterways".

Inter-American Association of Sanitary Engineering: Its purpose is to establish uniform standards for the continuous protection of health in the Western Hemisphere.

International Association of Hydraulic Research: The development of international standards in hydraulics is an expected benefit of the research done through the meetings of experts.

International Association of Hydrology: Adopted in 1951 a classification of snow and ice; is now studying the standardization of the hydrological characteristics of run-off and inventory of run-off.

International Commission on Irrigation and Drainage: Is bringing out an inter-lingual technical dictionary.

International Commission on Large Dams of the World Power Conference: Has published a technical and illustrated dictionary of dams in several languages.

International Water Supply Association: Is concerned with standards for drinking water; its Technical Nomenclature Commission has prepared an English-French Glossary of Waterworks Technical Terms.

Permanent International Association of Navigation Congresses: Is publishing a technical illustrated dictionary in six languages.

World Power Conference: Has to some extent regarded itself as representative of the "users" of standardization within its field; thus it was instrumental in the adoption of standard terms for the rating of rivers, promoted extensive study with a view to arriving at a uniform method of determining the constant in Chezy's formula of velocity of water in conduits, and in 1936 published "A Survey of the Present Organization of Standardization - National and International".

(b) Other international agreements

Economic Commission for Asia and the Far East: Is promoting international co-operation on an international river - the Mekong River Basin.

Economic Commission for Europe: Study of legal problems affecting international co-operation for hydro-electric development was pursued in 1949-1951 and additional future work may be done.

Food and Agriculture Organization: As an integral part of its work of development of national and international programmes and policies for land and water utilization and conservation is concerned with the formation or improvement of national organizations; laws and international agreements for the development of such programmes and policies.

The following inter-governmental bodies function for the purpose of reaching agreements and avoiding disputes regarding joint use of contiguous bodies of water: Central Commission for the Navigation of the Rhine; International Boundary and Water Commission; International Danube Commission; and the International Joint Commission.

The following organizations serve as instruments for reaching agreements regarding the regulation and proper exploitation of aquatic resources: International Council for the Exploration of the Sea; International Fisheries Commission; International Pacific Salmon Fisheries Commission, and International Whaling Commission.

International Union for the Protection of Nature: Has as one of its purposes that of the preparation of international agreements and the promotion of appropriate legislation for the preservation of wild life.

(c) Domestic legislation

Food and Agriculture Organization: See (b) above.

International Water Supply Association: Has studied government measures for the development and assistance of rural water supplies, and the legal aspects of protection of surface water against pollution.

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