



WATER RESOURCES DEVELOPMENT CENTRE
THIRD BIENNIAL REPORT

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NOTE

Symbols of United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.



WATER RESOURCES DEVELOPMENT CENTRE
Third biennial report

INTRODUCTION

1. The present report is the third submitted to the Council since the United Nations Water Resources Development Centre was established in 1959. ^{1/} It reviews developments during the years 1962 and 1963. Chapter I deals briefly with the activities and present situation of the Water Resources Development Centre; chapter II analyses water projects financed by the Special Fund; and chapter III gives an account of developments of common interest in the water field. In addition, a summary of current activities of the various United Nations organizations concerned is given in an annex.

^{1/} The first and second biennial reports were submitted to the Economic and Social Council at its twenty-ninth and thirty-third sessions, respectively /see Official Records of the Economic and Social Council, Twenty-ninth Session, Special Supplement (E/3319), and ibid., Thirty-third Session, Special Supplement (E/3587) respectively.

I. ACTIVITIES AND PRESENT SITUATION OF THE WATER RESOURCES DEVELOPMENT CENTRE

2. Since the second biennial report (E/3587) was submitted to the Economic and Social Council in April 1962, the activities of the Centre have been broadly along the same lines as those of previous years. It should, however, be noted that the Centre submitted to the Council at its thirty-sixth session, pursuant to resolution 876 (XXXIII), a report entitled "Proposals for a priority programme of co-ordinated action in the field of water resources within the framework of the United Nations Development Decade". ^{2/} It should also be noted that with regard to the organization of the Centre some steps were taken to implement the proposals made by the Administrative Committee on Co-ordination (ACC) at its thirty-third session and approved by the Council in the resolution mentioned above.

Current activities

3. During the last two years, the Centre continued its co-operation with the Special Fund by commenting on and evaluating requests submitted by Governments concerning water resources. It should be noted in that respect that more than forty requests were reviewed during this period and the comments of the Centre were circulated to the participating United Nations organizations.

4. Similarly, in the field of technical assistance the head of the Centre and/or its Technical Secretary participated *inter alia* in United Nations missions of experts concerned with problems of international river basin development, such as the Senegal and the Niger rivers in Africa.

5. The Centre initiated a series of studies of particular interest for developing countries and for which it has obtained the close co-operation of the various organizations concerned. In that context, the Centre has already circulated among its participating organizations the first draft of a document dealing with national water organizations, boards or commissions. This document reviews the reasons in favour of establishing a central organization dealing with over-all aspects of water resources development within a country; it gives a detailed outline of the functions and duties of existing national water agencies and makes suggestions as to how such bodies may be set up. Comments so far received from international organizations and the United Nations regional economic commissions are constructive and encouraging; furthermore, the idea has aroused great interest and is likely to be welcomed by the developing countries.

6. A study of the legal aspects of an international character relating to international river basin development was initiated. Notes on existing international river agreements were outlined, as well as particular problems likely to arise in drawing up agreements between newly independent countries. Several organizations, public and private, have already been consulted and will be invited to assist the Centre in its undertakings. An agreement has been reached between

^{2/} Official Records of the Economic and Social Council, Thirty-sixth Session, Annexes, agenda item 6, document E/3760.

the Centre and the Executive Secretary of the Economic Commission for Europe (ECE), whereby an ECE staff member, with legal qualifications and experience in water resources development programmes, has been designated to follow up related problems specifically for the Centre.

7. Among the economic studies suggested for the Centre's early attention was a study dealing with the value and cost of water for different uses (See E/3319, paras. 67-69). Various proposals regarding the study were discussed during inter-agency meetings. The study now in preparation concentrates on the value and cost of water for different productive uses in arid and semi-arid zones. It should result in providing Governments of developing countries, daily confronted with decisions on the allocation and pricing of their water resources, with proven techniques of economic evaluation.

8. Two regular annual inter-agency meetings were organized and serviced by the Centre during the period under review. The first was held at the headquarters of the World Meteorological Organization (WMO), Geneva, in July 1962, and the second at the headquarters of the International Atomic Energy Agency (IAEA), Vienna, in August 1963. In both cases, exchanges of views took place among United Nations organizations concerned with water resources on questions related to the Centre itself, the dissemination of information, Special Fund activities, the development of common interests and projects envisaged for the coming years. In addition, an extraordinary meeting was held in January 1964 at the headquarters, in Rome, of the Food and Agriculture Organization of the United Nations, to review, inter alia, the "Proposals for a priority programme of co-ordinated action in the field of water resources within the framework of the United Nations Development Decade" (E/3760), in conformity with the recommendation made in the Council's resolution 978 (XXXVI).

Water resources and the United Nations Development Decade

9. By resolution 876 (XXXIII), the Council requested that proposals for a priority programme of co-ordinated action in the water resources field within the framework of the United Nations Development Decade be drawn up by the Centre as soon as possible with the co-operation of the various organizations concerned. In accordance with the above, a report (E/3760) was prepared on behalf of the Centre by officers seconded by the Resources and Transport Division and a group of consultants engaged by the Division for this purpose. Pursuant to Council resolution 978 (XXXVI) and to specific recommendations made at the tenth inter-agency meeting, held at Vienna, in August 1963, the Centre prepared new documents for discussion during the extraordinary inter-agency meeting, held at Rome in January 1964. The three original proposals were kept, namely: (a) the preliminary country surveys of water needs and resources; (b) the preliminary surveys of international river basins of interest to developing countries; (c) the large-scale pre-development investigations of ground-water basins. In the new report (E/3863), however, additional chapters deal with organizational aspects of these surveys, training requirements and the necessary follow-up action. In addition, a series of annexes give relevant information on the activities of the various United Nations organizations concerned with water resources development. It is expected that the Centre will have to play an important role in the organization of the proposed surveys, as requested by Governments; the Centre would inter alia be called upon to circulate any survey report to the interested United Nations

organizations for evaluation before final presentation to the requesting countries, in order to ensure that full use has been made of the experience of all relevant organizations.

Organizational re-arrangement

10. It may be recalled that, for the first five years of its existence, the Centre was headed by the Director of the Resources and Transport Division. Moreover the Centre had no staff of its own, professional or clerical, and was serviced by the staff of the Division. The Division's financial allocation was utilized for the purpose of the Centre and in this way a number of valuable projects were undertaken jointly by the Centre and the Division. An example of this was the preparation, in co-operation with other United Nations organizations concerned with water resources, of the report on large-scale ground-water development (E/3424).

11. As pointed out in the second bi-annual report, however, this situation led to certain misunderstandings and, upon the advice of the ACC, the Economic and Social Council, at its thirty-third session, requested, in resolution 876 (XXXIII), that arrangements pertaining to the Centre be reviewed and concrete proposals to that effect be included in the ACC's report to the Council at its thirty-fourth session.

12. In its subsequent report to the Council (see E/3625, para. 126), the ACC agreed "(a) that the Centre, while remaining located at United Nations Headquarters, under the general supervision of the Secretary-General represented by the Under-Secretary for Economic and Social Affairs, shall be an independent office with its own head and its own staff provided by the United Nations and the agencies concerned; and (b) that besides the existing posts of Head of the Centre and Technical Secretary, the Centre will be staffed, as indicated in the statement of financial implications ^{3/} presented by the Secretary-General to the Council in connexion with the draft resolution leading to resolution 876 (XXXIII) with a senior economist, technical specialists as well as secretaries - clerks, as necessary".

13. Accordingly, in the course of 1963, a separation took place between the Division and the Centre to give the latter a broader degree of independence. However, except that the Director of the Division ceased to control the work of the Centre and that the Division seconded three members of its staff and the World Health Organization (WHO) one member of its staff to the Centre, there was little actual change as to budget facilities and office accommodation. Efforts made to recruit a new Director for the Centre and to obtain appropriate secondment from other specialized agencies and the IAEA were unsuccessful.

14. In the light of consultations which had taken place between the participating organizations, the ACC, at its meeting in Paris in April 1964, was led to review recent experiences of co-operation in the water resources field (See E/3886, paras. 95-98). The ACC recognized the positive role played by the Centre in the last years in focussing attention on the co-ordinated approach to the development and utilization of water resources and in carrying out a number of

^{3/} Ibid., Thirty-third Session, Annexes, agenda item 8, document E/L.945/Add.1.

studies of related problems which concern several of the participating organizations. The practical difficulties encountered in the functioning of the Centre, as well as the rapid growth of programmes and of regional activities within them, have led to the conclusion that the Centre as conceived two years ago, as an independent office with its own head and its own staff, was no longer the best machinery to deal with the co-ordination problems involved.

15. It was recognized that effective co-ordination is of fundamental importance in all aspects of water resources development, and that particular efforts are required in the case of large-scale multi-purpose development projects and international river basins development, where a large number of very important schemes are continuously planned or implemented. In addition, co-operative relations which have developed through the regular inter-agency meetings on water resources and the United Nations Water Resources Development Centre should be preserved and reinforced without recourse to new machinery.

16. Under these circumstances the ACC recommended that the focal point for co-ordination among the participating United Nations organizations should henceforth be provided by the inter-agency meetings on water resources, functioning as a sub-committee of the ACC and supplemented whenever necessary by ad hoc consultations on important projects and by the continuous exchange of information at a technical level.

17. It is agreed that this shift of emphasis on co-ordination should be effected without prejudice to the role of the United Nations Water Resources Development Centre in the United Nations programme of water resources development.

18. The Secretary-General's proposals regarding the future of the Centre, which give effect to these findings, are set forth in a separate document (E/3894)

II. WATER RESOURCES AND THE SPECIAL FUND

19. The Special Fund, like the Water Resources Development Centre, came into existence at the beginning of 1959 and between its inception and 31 December 1963, a total of 326 projects were approved, involving an expenditure of \$671 million.
20. Of these projects eighty-eight were, either wholly or partly, for the development of water resources and, for each of these, one or other of the Centre's participating organizations has been the executing agency.
21. The second biennial report of the Centre (E/3587) described those projects in the field of water which had been approved prior to 1962. These numbered forty-eight and, of this number eight have been completed - four by FAO, two by the International Bank for Reconstruction and Development (IBRD) and two by the United Nations, as well as one which was terminated before completion. Generally these were all either river basin surveys (including hydropower) or ground-water investigations.
22. The schemes completed by the United Nations Department of Economic and Social Affairs up to 31 December 1963 were:
- (a) Project for hydraulic development, China (approved in December 1959);
 - (b) Hydrographic survey of the Lower Mekong; this was a regional project, with Cambodia, Laos, Viet-Nam and Thailand as participants (approved in December 1960); and the following was terminated before completion:
 - (c) Resources development survey, Guinea (approved in May 1959).
23. Those carried out by the FAO, and completed by 31 December 1963 were the following:
- (d) Survey of the Volta Flood Plain, Ghana (approved in May 1959);
 - (e) Ground-water investigations, Greece (approved in May 1959);
 - (f) Survey of the ground-water resources of the Jezireh, Syria (approved in December 1959);
 - (g) Pre-investment survey of the Antalya region, Turkey (approved in May 1960).
24. The International Bank for Reconstruction and Development (IBRD) completed:
- (h) Georgetown Bar siltation and erosion study, British Guiana (approved in December 1959);
 - (i) Niger Dams survey, Nigeria (approved in December 1959).

25. Forty of the 170 projects approved by the Special Fund during 1962 and 1963 deal with water resources. To list the values, or the Special Fund allocations of funds to these projects, would be misleading, since the "water" element varies widely from project to project. However each is set out, by country, in the annex to this report, together with schemes receiving technical and financial assistance from other sources. In addition the following paragraphs will show these Special Fund projects listed under the organizations which carried the responsibility of being executing agency in each case. Brief details are given to illustrate the range and variety of work undertaken; it should also be noted that in every case training of local staff was an essential part of the duties of the agency executing the project.

26. It must also be pointed out that the descriptions given in this chapter refer only to Special Fund projects approved during 1962 and 1963. Other projects in the water field (forty-eight in all) were approved before 31 December 1961, and were referred to in the earlier biennial reports of the Centre; on most of these, work has been carried out during the period under review, and reference to this work has been made in the annex, though not in this chapter.

27. The Special Fund confines its assistance to pre-investment activities, particularly for carrying out surveys of resources and establishing or strengthening applied research institutes and training centres. In no case does it finance the whole of such projects, a substantial portion of the cost being borne by the requesting Government. The total cost of the forty projects referred to in this chapter is approximately \$65 million.

United Nations Department of Economic and Social Affairs

28. The Department of Economic and Social Affairs was designated as executing agency for fifteen projects dealing with water resources, totalling approximately \$23.5 million in cost. These projects fall into three categories:

(a) Ground-water exploration, either alone or in conjunction with investigations of other mineral resources. Projects in Afghanistan, Argentina and Lebanon are solely for ground-water. Projects in Burma, Cyprus, Madagascar, Upper Volta, Togo and Somalia are joint studies of ground-water and minerals. In the case of the last two countries, the surveys will be operated in close co-ordination with existing Special Fund projects, for which FAO is the executing agency;

(b) River basin surveys, either for a single purpose (such as the Mu River irrigation survey in Burma) or multi-purpose investigations. The latter cover the Choshui and Wu basins in China, the Chiriqui and Chico basins in Panama and the Mono basin in Dahomey and Togo. The last-mentioned involves an international agreement between the countries concerned. A survey in Ecuador comes under this heading and also (a) above, since this involves hydrological studies of various river basins as well as ground-water investigations;

(c) Hydroelectric surveys, including hydrological investigations and a power potential survey. Iceland is the only example of requests under this head during the period under review.

Food and Agriculture Organization of the United Nations (FAO)

29. The FAO was designated as executing agency for eighteen projects in the water field, totalling some \$30 million. These projects covered a wide range of surveys, investigations and applied research relating to water resources and utilization in agriculture.

30. Included in the work covered by these projects are hydrological investigations, drainage and land reclamation, ground-water surveys including geophysical exploration, forest and range management surveys, pilot fishery units, topographical surveys, pilot soil conservation schemes, geological studies, river basin surveys, tidal land reclamation, industrial surveys, setting up laboratories and nurseries; one project involves cloud-seeding studies for the inducement of additional rainfall.

31. The countries involved consist of Argentina, China, Congo (Brazzaville), Ghana, Guinea, Haiti, Iraq, Israel, Kenya, Lebanon, Mali, Morocco, Peru, Sudan, Syria, Tunisia, Turkey and the United Arab Republic.

International Atomic Energy Agency (IAEA)

32. The IAEA has been designated as executing agency for one Special Fund project dealing with water development, with a total value of \$700,000. This consisted of a hydroelectric survey and economic study in the Philippines, with an appraisal of conventional and nuclear energy potentialities, market studies and such other items as surveys of coal deposits unconnected with the work of the Water Resources Development Centre.

International Bank for Reconstruction and Development (IBRD)

33. The IBRD undertook, as executing agency, two water development projects in Brazil with a total value of \$4.9 million. These consisted of river basin surveys of the Parana, Paranaiba, Itabapoana, Ribeira, Sao Fransisco, Grande, Doce, Jequetinhonha and Paraiba rivers, including hydrological studies, economic and power market surveys and technical feasibility studies of hydroelectric sites.

United Nations Educational, Scientific and Cultural Organization (UNESCO)

34. UNESCO's involvement in the water side of Special Fund activities was to act as executing agency for one project in Tunisia, costing \$1.8 million. This project consisted of laboratory and field studies on the utilization of saline water for irrigation.

World Health Organization (WHO)

35. WHO was designated executing agency for one project, costing \$2.15 million. This involved the preparation of a master plan for water supply and sewerage for the principal urban areas of Ghana, and the setting up of a corporation to operate and manage these essential services.

World Meteorological Organization (WMO)

36. WMO was executing agency for two projects, together costing \$1.7 million, in Burma and in Thailand. Both projects consisted of strengthening and improving existing meteorological services and the setting up of laboratories and the carrying out of research.

III. DEVELOPMENTS OF COMMON INTEREST

37. Among the various activities of the United Nations organizations in the water field, 4/ the tendency is towards an increase in that type of project which involves the work of two or more of these organizations. This tendency is likely to increase in the future for a number of reasons.

38. First, because of increased skills and experience acquired, more efficient and sophisticated techniques are being placed at the disposal of Governments, and such modern usages as geophysical exploration, isotope tracers and demineralization equipment are now regularly employed to find and develop water resources in areas where, until recently, the chances of economic development were remote. These techniques call for increased specialization, with particular competence being acquired by the different organizations, and only by planned joint use of this competence can the best practical results be obtained.

39. Second, the concept of multipurpose development has proved to be so successful, where tried out, that it seems inevitable that future country planning will move more and more in this direction. In particular, the development of river basins as single units promises such advantages in economic development as to make it almost certain that more requests for this type of planning will be received. To carry this out successfully the co-ordinated work of a number of organizations is the only efficient answer.

40. Third, with the increased interest and activity - both national and international- in water development throughout the world, there is a rising demand for experienced specialists in this field, and in certain directions work is already being slowed down by the difficulty of obtaining such staff. It is becoming more and more necessary to make the best use of experienced men, and close co-ordination between the organizations enables the most efficient use to be made of their respective staffs.

41. The following details show some ways in which joint action has proved successful during 1962 and 1963; as pointed out in chapter I (above) the Water Resources Development Centre has played a certain role in co-ordinating these activities. The demand for this type of co-ordination is expected to increase materially in the near future.

Water resources terminology

42. This is a project undertaken by the United Nations Educational, Scientific and Cultural Organization (UNESCO), in which the various United Nations organizations concerned are participating by supplying relevant information related to their respective activities in the water resources field. Among others, the World Meteorological Organization (WMO) is particularly interested in relation

4/ For details, see the annex to the present report.

to its international meteorological vocabulary, which was issued recently, and on which further terminological work in the field of hydrology is contemplated in co-operation with UNESCO.

43. A preliminary publication on multilingual terminology on ground-water was issued; this contained some 800 French terms, with their definitions, relating to ground water, with translations of these definitions into English, Spanish and partly into German, for the corresponding terms in those languages to be added by specialists.

Hydrological meteorology

44. In April 1963, the fourth Congress of the World Meteorological Organization (WMO) decided to rename its Commission for Hydrological Meteorology as the "Commission for Hydrometeorology"; it was also decided to widen the Commission's terms of reference in order to cover both meteorological and hydrological requirements in the field of water resources; it was felt that the new name of the Commission would reflect the true nature of its work. Furthermore, the Congress, in its resolution, directed its Executive Committee to promote co-ordination of efforts for the development of water resources by arranging for participation in the activities of the United Nations Water Resources Development Centre, in accordance with resolution 876 (XXXIII) of the Economic and Social Council. In this connexion, it was emphasized that the various activities of WMO in the field of hydrology and meteorology were important for the development and rational utilization of water resources.

45. One of the most valuable tasks of the Commission was the preparation of a guide on hydrometeorology, including sections devoted to instruments and observing practices, network design, collection, processing and publication of data, methods of analysis, hydrological forecasting, and application of hydrometeorology to water resources development. The draft guide was expected to be submitted to the second session of the Commission, to be held in March-April 1964.

46. In the hydrological meteorology domain, the WMO Congress decided that the organization must play an appropriate part in the International Hydrologic Decade by devoting special attention to this large-scale programme and by maintaining close contact with UNESCO; members of WMO were urged to take an active part in the International Conference on Hydrology, planned by UNESCO for 1964. The Congress confirmed the WMO's policy in the field of water resources development and its active participation in the priority programme of joint action within the framework of the United Nations Development Decade. WMO's main objectives with regard to the two decades were established as follows: (a) the improvement of hydrometeorological networks and services; (b) the standardization of instruments and methods of observations; (c) the preparation of guides and other practical aid; (d) the promotion of scientific research; (e) education and training. Co-operation was also effective between WMO and the regional economic commissions of the United Nations; the Economic Commission for Asia and the Far East (ECAFE) organized jointly with WMO two hydrological seminars, and a third one dedicated to hydrological forecasting was prepared. Outside the United Nations family, and within the hydrological meteorology field, WMO continued close collaboration with the International Association of Scientific Hydrology (IASH) and a joint IASH/WMO symposium on the hydrological aspects of droughts held during the General Assembly of the International Union of Geodesy and Geophysics (IUGG), held in Berkeley

(California, United States), in August 1963. Another aspect of effective action was the new WMO Development Fund, considered as a special form of regular technical assistance programme of the organization.

Scientific hydrology

47. A meeting of scientists, held in Athens (Greece) in September 1961, made plans for a long-term programme of scientific hydrology. The proposals were followed up by a resolution of the UNESCO Executive Board in November 1961. A first committee of experts of the UNESCO General Conference, meeting in November 1962, paved the way for the definition of the general scope of the programme and the machinery for its implementation. Again in Paris, in May 1963, a meeting of experts prepared the programme 5/ of the scientific hydrology project now known as the International Hydrology Decade. It was intended that the UNESCO secretariat should prepare a new working document for the inter-governmental meeting of experts scheduled to be convened in Paris from 7 to 17 April 1964, for the purpose of finalizing the programme of the decade, including its organizational aspects.

48. The main objectives of this decade will be as follows:

(a) To intensify the study of water resources and of their regimen with a view to their rational utilization;

(b) To apply to the utilization and conservation of those resources the established scientific principles of all branches of hydrology;

(c) To promote the teaching of hydrology and to train the necessary hydrological specialists at all levels.

49. The programme will have national, regional, continental and global aspects and will consist of a number of basic operations.

50. The International Hydrology Decade is envisaged as a co-operative international programme of scientific research and training in the field of hydrology where the participating countries would be expected to bear the major share of the expenses involved, but where, of course, technical and other assistance would have to come from UNESCO, either under the regular programme of technical assistance, from all agencies and organizations concerned (particularly WHO, WMO and FAO, or through bilateral channels. As a supporting action for its hydrologic decade, UNESCO is planning a substantial programme of exchange of scientific information and of training of hydrologists, with a view to facilitating the participation of developing countries in the decade as well as promoting the development of hydrology in general.

51. In the past few years, considerable attention had been focused in the developing countries on programmes for the collection of basic data of water resources, and making an inventory of possible water use projects. In some areas this work is well advanced and the need for detailed investigations for planning is pressing in order that construction and development can proceed. It is felt

5/ UNESCO/NS/181.

that, with a view to assisting the developing countries in achieving uniformity in water resources investigations and the presentation of plans of development, and to ensure the adequacy and reliability of information submitted to financing agencies in support of requests for project approval and development funds, it will be useful to prepare a manual of standards for planning water resources projects. The ECAFE secretariat has taken a step in this direction and has completed a draft manual of standards and criteria for planning water resource projects. This manual sets forth acceptable standards for basic data, guide lines for conducting adequate project investigations, and procedures and criteria to be followed in the formulation and appraisal of plans. The final draft incorporated many suggestions contributed by organizations and agencies participating in the Water Resources Development Centre.

Isotopes in hydrology

52. The use of isotope techniques in hydrological problems is increasing in importance in the water resources development field. The IAEA, in close co-operation with other United Nations organizations, is widening its activities in this domain.

53. A world-wide survey of tritium and stable isotopes in precipitation, in co-operation with the WMO, was continued and at present ninety-seven stations all over the world are participating in the sampling programmes. In connexion with this undertaking, considerable progress was made by setting up a most modernly equipped laboratory at the IAEA headquarters in Vienna; servicing of the analysis of tritium in ground-water studies was also implemented. Successively, research contracts on the use of isotopes in hydrological problems were awarded, a panel of experts was convened and discussed all possible aspects of isotope applications in hydrology, and a comprehensive technical report was issued in the agency's Technical Report Series. Field activities of the agency were also increased: experiments on tritium utilization were carried out, in co-operation with the FAO and within the Special Fund's scope, in Greece and Turkey; other field experiments were also in progress in Cambodia and Kenya and planned in Jordan. Assistance to the developing countries was also very effective: special missions visited Pakistan and India on the application of isotope techniques to ground-water problems, and also Argentina and Chile to advise on the feasibility of applying isotope techniques to priority problems selected by the local authorities.

54. Conferences, symposia and meetings were organized by IAEA: in March 1963, in Tokyo, Japan, a symposium was held on the application of radioisotopes in hydrology, the proceedings of which reflect the present status of these methods. Prior to this symposium, in December 1962, a group of experts was convened to advise on the most profitable lines of future development and the best means of achievements. The meeting endorsed the recommendations made at the panel meeting held in 1961 on this subject 6/ and strongly emphasized that the IAEA should urge its member States to consider the application of isotope techniques to problems of hydrology and hydraulic engineering in comparison with standard methods. Training aspects are not neglected as the agency is helping to provide trained personnel both by placement of fellows in suitable laboratories in member States and also in the agency's laboratory.

6/ International Atomic Energy Agency, Technical Reports Series No. 11, Application of Isotope Techniques in Hydrology (Vienna, 1962).

55. As for information, the IAEA is acting as an information centre for the application of isotope techniques by distributing the results obtained from member States, the United Nations organizations and other interested bodies.

Arid and tropical zones problems

56. These two areas of activity, in which UNESCO plays a leading role, were initiated with good prospects for important achievements relating to water resources development. However, one of them, namely the arid zone research programme, came to an end as a major project at the end of 1962, but was continued on a modified basis and without the previous geographical limitation. Emphasis was therefore laid on Latin American countries, inter alia, through a conference on the arid zone problems of Latin America, held in Buenos Aires in September 1963. Under a somewhat reduced regular programme, symposia and seminars continued to be organized, as the preparation and distribution of publications and newsletters was pursued. On the other hand, under the technical assistance programme, projects related to arid zone research were expected to increase and a first Special Fund project on irrigation with saline water was implemented in Tunisia. In addition, UNESCO encouraged inter-governmental co-operative research on specific projects such as the study of artesian ground-water basins in north Africa. Close co-operation was maintained for the arid zone programme with other interested organizations, particularly with FAO and WMO, through joint meetings.

57. As regards the other area, the humid tropics research programme, except for activities concerning the deltaic areas, the programme is rather marginal to water resources development. Among the achievements for the last two years, an important regional seminar on the development of ground-water resources with special reference to deltaic areas was held in Bangkok (Thailand) in April-May 1962; it was jointly organized and sponsored by ECAFE, the United Nations Bureau of Technical Assistance Operations (BTAO), and UNESCO.

58. Generally speaking, for both programmes - arid zones and tropical humid zones - the approach is scientific research and training of specialists, one of their common and important achievements being to draw the attention of Governments, on the one hand, and of scientists, on the other, to the specific problems of these areas which have so far been neglected.

International river basins

59. In chapter I of the present report, mention was made in several instances of the growing activities by the Centre and its participating organizations in the field of international river basins of interest to the developing countries. Nevertheless, it should be emphasized again that the problems raised by the development of international river basins of interest to several developing countries, and international action to help solve them, have received particular attention during the last two years.

60. In Asia, the Mekong river basin development project is still the most important multi-purpose undertaking on an international basis. Under the direction of the Committee for Co-ordination of Investigations of the Lower Mekong Basin, an inter-governmental body established under the aegis of ECAFE by the four

riparian countries, Cambodia, Laos, Thailand, and the Republic of Viet-Nam, the programme of investigations and studies was continued extensively with the co-operation of twenty countries (Australia, Canada, China, Denmark, Finland, France, India, Iran, Italy, Israel, Japan, Netherlands, New Zealand, Norway, Pakistan, Philippines, Sweden, United Kingdom, United States of America, Federal Republic of Germany), and twelve United Nations agencies (Bureau of Technical Assistance Operations, Technical Assistance Board, Special Fund, World Food Programme, ECAFE, IAEA, IBRD, ILO, FAO, UNESCO, WHO, WMO), as well as three foundations, namely the Asia Foundation, the Ford Foundation, Resources for the Future, Inc., and private firms. Financial resources put at the disposal of the Mekong Committee amounted to more than \$44 million as of January 1963.

61. The Mekong Committee actively carried forward its five-year programme of studies and investigations, initiated in 1959, which called for the systematic collection of engineering and other related data and the undertaking of surveys and investigations required for the planning of individual water development projects, both in the mainstream and tributaries as well as for the preparation of a comprehensive river basin plan. During the past two years, considerable progress ^{7/} has been achieved in this programme, including the collection of meteorological and hydrologic data from a network of stations, topographic surveys and mapping, geological investigations and borings at prospective dam sites, hydrographic surveys and marking of navigation channels, as well as ancillary studies and surveys, such as agricultural experimental stations, mineral resources surveys, power market studies and social and economic studies. Specifically, project planning was under way for three projects on the mainstream and feasibility reports were completed for seven projects in the tributaries. The Mekong Committee was, in fact, able to complete the major part of its five-year programme of studies and investigations ahead of schedule, and has already embarked on the construction of the five projects in the tributaries, namely: the Prek Thnot project in Cambodia, the Lower Se Done project and Nam Don project in Laos, and the Nam Pong project and Nam Pung project in Thailand. Most of these projects were multiple-purpose in character, involving the generation of hydroelectric power, provision of irrigation and regulation of flood flows.

62. On the African continent, consultations, surveys and studies on three major international river basins were carried out at a relatively high speed, under the auspices of the most desirable international co-operation, and achievements obtained are indeed promising.

63. In the field of surveys and studies on the Niger River a report, prepared in 1962 by a consulting firm on behalf of the United Nations, was the basis for a constructive exchange of views between the riparian States of the Niger River basin. In this connexion, two inter-State conferences were held in Niamey, the capital of the Republic of Niger, in 1963, the result of which was the signing of an international act, known as the Act of Niamey, on 25 October 1963, relating to navigation on the Niger River and economic co-operation between its nine riparian States.

64. As to the Senegal River basin, a United Nations technical assistance mission made an inventory, at the request of the four riparian countries concerned

^{7/} For more details on progress, see document E/CN.11/646 (E/CN.11/WRD/MKG/L.116/Rev.1).

(Guinea, Mali, Mauritania and Senegal), of the problems relating to the eventual integrated development of the basin. The conclusions of the mission's report 8/ were endorsed by an inter-State committee and a number of projects of common interest are now under consideration in the fields of agriculture, hydropower, navigation and mineral resources development.

65. A meeting of experts of the four riparian countries, held in December 1963, in Nouakchott, capital of the Islamic Republic of Mauritania, reflected the definite will of the riparian countries to co-operate closely in the development of the basin; specifically, it reviewed the United Nations mission's reports, formulated a general policy for the development of the basin, and examined various draft documents concerning a convention of the statute of the river and the internal organization of the permanent general secretariat. As a follow-up to the Nouakchott meeting, several requests and projects of a feasibility and pre-investment nature were under consideration by the Special Fund, among others.

66. The Mono river basin, common to Dahomey and Togo, may be considered as an area of growing activity on the part of those members of the United Nations family that are concerned with water resources. In the upper reaches of the river and outside the basin within Togo territory, the FAO is carrying out a land and water use survey. A second project, of an international character and presently under execution by the United Nations, was undertaken for a feasibility survey of the integrated hydraulic development of the river and a survey of the power market in both riparian countries. A third project, to be executed by the United Nations and also of an international character calls for an electric power development survey in Dahomey and Togo, for electricity interconnexion between the two countries and hydropower development in the Mono river valley as well. All these projects are to be executed with the Special Fund's technical and financial assistance.

Community water supplies

67. The water supply of rural areas, towns and cities constitute priorities in any water resources survey and one of the various stages in the process of economic development. Adequate water service, in quantity and in quality, is an attainable objective provided that studies and implementation of schemes are co-ordinated.

68. Since population growth in urban areas was reported to be in the order of 5 per cent a year, while the rate of water supply construction was lagging seriously behind, the WHO, as parts of its programme of environmental health, has greatly stepped up its activities in community water supplies and these are likely to increase rapidly in the future.

69. Yet only one third of the urban populations of the developing countries and less than one tenth of their total populations, enjoy the benefits of a piped water supply, and a similar number have access only to public outlets, situated sometimes hundreds of yards from their homes, involving the laborious carrying of small quantities of water which may become contaminated before use. A recent survey, conducted by WHO, covered seventy-five developing countries in Africa,

8/ This report has not yet been released for distribution as a United Nations document.

Asia and Latin America, whose urban population totals 320 million at present, and is estimated to increase by 64 per cent by 1975. Of the present urban population, only 33 per cent have piped water in the home, and approximately one half of this group receive supplies which are inadequate or unsafe. In order to give the urban dwellers in these 75 countries a piped supply reasonably accessible to their homes, an average expenditure of at least \$450 million per annum over the next fifteen years will be necessary; this represents about 1/4 of 1 per cent of the gross national product of the countries concerned. The present expenditure on this vital service is estimated at less than one eighth of this amount. Hence the problem gets worse daily, since the population growth outstrips the rate at which supplies are being provided in almost every developing country.

70. The WHO and its affiliate, the Pan American Health Organization (PAHO), through their regular budget and also by means of other financial contributions - including voluntary contributions to the WHO Community Water Supply Special Account from Germany, Kuwait, Morocco and the United States of America - concentrated on the fundamental aspects of the problem, such as the training of engineers and the establishment of water supply organizations based on sound financial foundations. The community water supply programme is now being accelerated, and its initial phase resulted in an increasing awareness on the part of member Governments of the necessity of meeting the growing needs in this field. More than forty Governments of the developing countries were assisted during the period under review in creating sound national and local administrative organizations, in the preparation of preliminary engineering and feasibility reports on selected projects leading to internal and external financing, in the training of technical and managerial personnel and through the dissemination of technical information.

71. For most of its community water supply programme, WHO maintains close co-operation with other United Nations organizations having responsibilities in the water resources domain and especially with the IBRD, the Special Fund and the FAO. The IBRD and its affiliate, the International Development Association (IDA), have largely increased their financial assistance for water supply schemes during the last two years; and for its part the Special Fund, with WHO as executing agency, is providing funds and technical assistance in this field. Details on projects are given in section D of the annex to this report.

Irrigation and drainage

72. In most developing countries agriculture is the largest consumer of water. This tendency is likely to increase even more throughout most of the world owing to the considerable expansion of irrigated areas. Irrigation schemes, however, cannot be properly designed and constructed without taking soils and drainage conditions and connected problems into account. Too many irrigated lands have already been affected by water-logging and salinity, and in many areas the livelihoods of millions of people, who depend upon this form of cultivation, are seriously threatened.

73. The FAO participates in water development programmes wherever agriculture is the sole or at least the main beneficiary. It is the organization's well defined principle that no separation can take place between water resources inventory and the construction of irrigation and drainage works on the one hand, and their

sound exploitation and maintenance, on the other. Thus FAO, although primarily concerned with the proper design and operation of irrigation and drainage projects, includes also, in its activities, hydrology, hydrogeology, and water legislation.

74. For the last two years substantive achievements have been recorded. As regards research and publication, good progress was made on the joint FAO/UNESCO international source book on irrigation and drainage of arid lands in relation to salinity. Economic aspects of irrigation planning were also under review and, for this purpose, a questionnaire on the sale of irrigation water is being prepared. Other pamphlets are under preparation, covering water management techniques and irrigation research.

75. Activities in the developing countries were expanded through the Expanded Programme of Technical Assistance and on Special Fund projects for which FAO is the executing agency. In co-operation with other United Nations organizations, a large number of pre-investment surveys were undertaken as well as projects of a more specific nature. Teams of experts in irrigation and drainage practices were organized in various countries under EPTA (Afghanistan, Nepal, Iran and Tanganyika, for instance) in order to cover the various aspects of water development for agricultural purposes, to train national irrigation specialists, and to help with building up irrigation departments. More than one hundred individual experts were assigned under EPTA to about thirty different countries for water resources investigations, irrigation and drainage engineering, and water use or training. Training courses and seminars on irrigation were held in various parts of the world. In relation to irrigation and drainage and at the request of several Governments, studies of water legislations were carried out, notably in Cyprus, Libya and Somalia. Besides EPTA, a large part of FAO's activities in the water development field was concentrated in projects executed with the financial support of the Special Fund: more than twenty projects are mainly concerned with irrigation, while some twenty more are devoted in large measure to water resources and subsequent irrigation development; 160 water development and irrigation posts were filled within FAO/Special Fund projects. Details of FAO's activities in the above-mentioned undertakings are given in the annex to this report.

76. Two more areas of this organization's scope of responsibility were those covered by the Freedom From Hunger Campaign (FFHC) and the World Food Programme (WFP). Some of the projects within these two world-wide programmes are concerned with irrigation, drainage and village water supply, always in a very practical way.

77. As in the past, for the two years under review FAO maintained close contacts and a common approach to the various and increasing problems of irrigation and drainage with IAEA in Greece and Turkey, with UNESCO in Tunisia and the European Commission of Agriculture and non-governmental organizations, such as the International Commission on Irrigation and Drainage (ICID) and the International Commission for Agricultural Engineering (ICAE).

Desalination of sea and brackish waters

78. In the second biennial report of the Centre (see E/3587, para. 63), it was mentioned that various aspects of desalination of saline water were kept under close surveillance by the United Nations organizations. Two years later, in the present biennial report of the Centre, it can be stated that this has become even more true.

79. In 1962 the United Nations Resources and Transport Division conducted a field survey of possibilities for the economic utilization of desalinated sea and brackish water in water-deficient areas of developing countries. Forty-three countries and territories were visited in this connexion. In the course of 1963 the vast mass of material collected was analysed and a report was prepared for submission to the Economic and Social Council at its thirty-seventh session. In addition to forty-two country reports, the document will contain an introductory section, summarizing the findings of the survey and the economics of desalination, and appendices. Besides the survey and partly as a by-product of it, the United Nations rendered technical assistance in this field, such as through BTAO missions in Argentina, Tunisia and the Netherlands Antilles; additional missions are scheduled for Saudi Arabia, the United Arab Republic and other countries, and more requests to the United Nations are expected. In the case of Tunisia, for example, a team of three BTAO experts undertook in 1963 a comprehensive study of water supply and demand conditions in southern Tunisia, particularly in relation to the industrial complex scheduled there; the resulting major report, prepared with the help of Headquarters specialists, includes recommendations concerning the establishment of a desalination plant combined with a conventional power plant as the most economic solution.

80. Among the major technological problems that still must be solved to provide low-cost fresh water from sea or brackish water, energy requirements and cost deserve most attention. Along these lines the IAEA, considering that nuclear energy may, in the near future, be important in the conversion of sea and brackish water into fresh water, started to deal with different aspects of demineralization on a large scale. In particular, a study entitled Desalination of Water Using Conventional and Nuclear Energy was published. 9/ In 1963, IAEA convened two panels of experts on the use of nuclear energy for saline water conversion; the first related to the general status of desalination, the second to the different possible schemes of nuclear conversion plant, with a certain emphasis on dual-purpose installations. In the field, at the request of the Tunisian Government, the agency is studying means of water desalination for municipal and industrial supplies in conjunction with the generation and use of nuclear power.

81. For its part, the IBRD moved into the area of desalination of sea water by making a loan of several million dollars to Malta for a combined thermal electric power and sea water distillation project with a capacity of one million imperial gallons a day.

82. UNESCO, whose interest in desalination is of a scientific character, is nevertheless active in the field, particularly in Tunisia where a plant converts brackish water for use in irrigation; after three years of operation, promising results were shown. In co-operation with the United States Office of Saline Water, the organization was reported to be planning a symposium for 1964 on the physico-chemical aspects of desalination, practical methods and pilot-project construction. With the assistance of some advanced countries, and in co-operation with IAEA, possibilities of erecting a low-cost reactor for field experiments are under consideration.

9/ International Atomic Energy Agency, Technical Reports Series No. 24 (Vienna, 1964).

83. For FAO the importance of obtaining water for irrigation and live-stock from the sea or from brackish aquifers cannot be ignored. This organization was represented at several meetings and panels of experts which dealt with desalination.

84. In connexion with these challenging undertakings, the Centre was consulted by some of its participating organizations and provided advice, bearing in mind the obvious necessity of maintaining co-ordination and improving the exchange of information in this complex and diversified area of activity and problems.

Water pollution problems

85. With the increasing complexity of pollutants, the problems of water pollution, with the side effects on human health, animals, fish and vegetation, are becoming yearly more serious. WHO, whose air and water pollution section operates throughout the world, are nevertheless most active in the more highly developed areas and work very closely with the regional commissions - ECE, in particular - advising Governments, assisting in the solution of international problems and maintaining a wide and continuous exchange of information.

86. In Europe, work on water pollution control has continued to be concentrated on pollution problems as they present themselves in a highly industrialized region. The ECE continued its systematic co-operation on these topics with the secretariats of FAO, WHO, WMO, UNESCO and the IAEA and, where appropriate, with other international organizations - both governmental and non-governmental - which are concerned with one or more aspects of these problems.

87. In July 1962 and 1963 the ECE secretariat convened the second and third inter-secretariat meetings respectively, between secretariat officials of the above-mentioned organizations, to exchange information on and to concert relevant programmes and activities in the field of water pollution control. The secretariat continued its co-operation with the secretariat of the Organization for Economic Co-operation and Development (OECD) in the preparation of a directory of water pollution research laboratories which will contain information about the research programmes of such laboratories and more specifically about any work done on urgent water pollution problems requiring attention.

88. In accordance with the programme of work which was approved by the ECE in 1961, the Secretariat continued to study legal, administrative, economic and certain technical aspects of water pollution control problems. A questionnaire was drawn up and circulated to ECE Governments on water quality criteria for industrial use, the purpose of which is to collect the basic information needed to make an attempt to elaborate an internationally acceptable classification of surface waters.

89. Provisional arrangements are being made for a meeting of experts to study the possibility of unifying water quality measuring instruments. A meeting of experts is also planned to examine a draft set of rules dealing with the prevention and abatement of the pollution of international water courses. These activities are conducted in close co-ordination with the various international organizations interested in these problems.

90. The ECE secretariat organized, in co-operation with the Regional Office for Europe of the World Health Organization, a travelling seminar on water pollution on the Rhine from 30 September to 10 October 1962. The object of this seminar was to study at first hand the entire complex of problems arising from water pollution on an international river running through a highly industrialized and densely populated area. It was attended by forty-five experts from seventeen European countries, as well as by an expert from Japan. The seminar was held aboard a boat travelling from Basle to Rotterdam. During the trip the participants visited industrial plants, administrative bodies, scientific research institutes and municipal treatment installations located in the four riparian countries along the Rhine. During the seminar, specialists of the riparian states concerned delivered lectures on the technical, economic, legal and sanitary aspects of pollution problems on the Rhine against the background of general measures taken or envisaged in their countries to combat water pollution. The lectures delivered at the seminar were reproduced in a volume entitled "Water Pollution Problems on the Rhine River" (WATER POLL./SEM.5).

91. In the developing countries, where so far water pollution problems are less acute, WHO are more concerned with prevention than with cure by encouraging provision for the treatment and disposal of wastes, and assisting with technical and other advice to this end. The same service was offered to those responsible for the development of industry.

92. In addition, the International Development Association (IDA) gave assistance in the field of sewage by extending credits to the Government of Pakistan for construction of facilities in Dacca and Chittagong.

93. The problem of water pollution is also receiving attention by the developing countries of Asia and the Far East. At the fifth regional conference on water resources development, organized by ECAFFE in December 1962, in Bangkok, the subject of water pollution and its control was one of the main items of discussions. The conference, attended by representatives from nineteen countries, recognized the fact that water quality management should be included as an integral part of water resources planning.

94. Waste disposal of radioactive materials may have in some cases a direct relationship with water resources and, subsequently, direct serious implications, particularly in the case of underground storage. IAEA, in close co-ordination with WHO, are very active on this particular problem. Panels of experts were convened to discuss the scientific aspects of ground disposal of radioactive waste waters and burial of radioactive solid wastes, particularly with respect to the prevention of pollution of water supplies, and on methods of surveying and monitoring marine radioactivity. Several symposia on the same topics were organized, the importance of safeguarding local water resources being one of the subjects continually stressed. A report entitled Disposal of Radioactive Wastes into Fresh Water ^{10/} was published.

95. It is not only by drinking that man can become infected with diseases through the agency of water. Malaria, bilharziasis, dracuntiasis, filariasis, onchocerciasis, to name but a few, are all spread by means of water, and any

^{10/} International Atomic Energy Agency, Safety Series No. 10 (Vienna, 1963).

control works such as irrigation, drainage, or hydro-electric projects are likely to affect the incidence of such diseases - sometimes for the better but usually for the worse. Bilharziasis, in particular, from which it is estimated that 150 million people, or one in twenty of the world's population, are suffering at the present moment, is encouraged and spread by irrigation projects. Onchocerciasis, or river blindness, may be aggravated by hydropower construction. Malaria may be increased by flood control reservoirs.

96. The WHO is concerned, not primarily with the cure of these diseases, but with their prevention. Research into methods of eliminating the parasites and their vectors is continually being carried out all over the world, together with experimental work on actual projects to discover means of preventing these from becoming infested. The organization co-operates with any international or national agency engaged in water development of any description, and assists, as requested, with investigations and the design of precautionary measures against water related diseases of all kinds.

Annex

CURRENT ACTIVITIES OF UNITED NATIONS ORGANIZATIONS IN THE FIELD OF WATER RESOURCES

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INTRODUCTION

The present annex summarizes activities, mainly during 1962 and 1963, of United Nations organizations in the field of water resources, on the basis of information mostly made available to the Water Resources Development Centre (WRDC) specially for this purpose by the other units and organizations concerned, namely: in the United Nations Department of Economic and Social Affairs - the Resources and Transport Division (UNRTD), the Bureau of Technical Assistance Operations (BTAO) and the Division for Public Administration (OPEX programme), at Headquarters, and the secretariats of the Economic Commission for Africa (ECA), the Economic Commission for Asia and the Far East (ECAFE), the Economic Commission for Europe (ECE) and the Economic Commission for Latin America (ECLA); the United Nations Children's Fund (UNICEF) and the Special Fund (SF); the Food and Agriculture Organization of the United Nations (FAO); the International Atomic Energy Agency (IAEA); the International Bank for Reconstruction and Development (IBRD); the International Development Association (IDA); the International Labour Organisation (ILO); the United Nations Educational, Scientific and Cultural Organization (UNESCO); the World Health Organization (WHO) and its affiliate, the Pan American Health Organization (PAHO); and the World Meteorological Organization (WMO).

The activities are classified according to type under four main headings: (a) conferences, working parties and seminars; (b) research and studies; (c) publications; and (d) technical and financial assistance. Section (d) is subdivided by region and by country. The agency or office concerned is indicated by its initials after each activity. For Special Fund projects, the initials coupled to "SF" are those of the designated executing agency.

The presentation is comparable to that of the annex (mainly covering 1960 and 1961) in the Second Biennial Report (E/3587) of the Water Resources Development Centre submitted in 1962.

A. CONFERENCES, WORKING PARTIES AND SEMINARS

In this field of water resources development activities there are major subject groups and the items are classified under the most relevant subject, although in some instances several subjects may have been dealt with.

Water resources development (general)

The Ninth Inter-Agency Meeting on International Co-operation with respect to the development and utilization of water resources was held in Geneva in July 1962, and the Tenth Inter-Agency Meeting in Vienna in August 1963. Both meetings were attended by representatives from most of the United Nations organizations who are participating in the Water Resources Development Centre and who co-operate through it [WRDC].

In September 1962, a special meeting was held in Paris for the definition of proposals for a priority programme of co-ordinated action in the water resources field within the framework of the United Nations Development Decade. This meeting, organized by the Water Resources Development Centre, was attended by representatives of the United Nations organizations and specialized agencies concerned. [WRDC]

In November 1962, in New York, the Water Resources Development Centre organized and sponsored a panel of consultants for the preparation of a priority programme of co-ordinated action in the water resources field within the framework of the United Nations Development Decade. Officers seconded from several participating organizations to the Centre assisted in the preparation of the report. [WRDC]

The first meeting of the Standing Committee on Industry, Transport and Natural Resources was held in Addis Ababa in December 1962. This meeting was organized by ECA and attended by representatives of African countries and specialized agencies. The work programme of the water resources unit was defined and the recommendations made were endorsed by the Economic Commission for Africa at its fifth session. In December 1963, the second session of the same Committee was held again in Addis Ababa. The Standing Committee has devoted special attention to the training of technicians, to seminars in respect of water resources development, and to the development of Africa's international river basins. [ECA]

The Fifth Regional Conference on Water Resources Development for Asia and the Far East was convened in November 1962 at Bangkok. The Conference made a review of the progress of water resources development in the ECAFE region during 1961-1962; examined in detail the various criteria and problems in the formulation of water resources development; considered problems arising from water pollution and its control; and discussed flood control measures and technical and economic limitations to their application. The Conference concluded with a study tour of major water resources development projects in north and central Thailand. [ECAFE]

A Regional Symposium on Flood Control, Reclamation, Utilization and Development of Deltaic Areas was convened in July 1963 at Bangkok. The Symposium discussed three main aspects of delta development, namely: (a) the natural framework of deltaic areas and the data required for planning development; (b) present stage of development of deltaic areas; (c) possibilities and problems of further development of deltaic areas. [ECAFE/BTAO]

A regional seminar on the development of ground-water resources with particular reference to deltaic areas was convened in Bangkok from 24 April to 8 May 1962 jointly by UNESCO and the United Nations Economic Commission for Asia and the Far East (ECAFE). Fifty-one participating experts from fourteen Asian Member States, France, the Federal Republic of Germany, the United States of America and the Union of Soviet Socialist Republics attended as well as observers from the United Nations Water Resources Development Centre, FAO, WHO, WMO and the International Commission for Irrigation and Drainage. The participants reached a series of conclusions concerning ground-water hydrology and proposed ways of further disseminating the most advanced investigation and planning techniques for developing ground-water resources, in particular for irrigation and for industrial and rural water developments. [ECAFE/BTAO/UNESCO]

A regional training course on the prospection and evaluation of ground-water resources was organized in Lahore (Pakistan) from 18 March to 14 April 1962 by UNESCO and the Government of Pakistan. The course was jointly conducted by specialists from France, USA and USSR. Twenty-five participants from Burma, Ceylon, India and Pakistan attended ten days of lectures and spent twenty days at practical work in the field. [UNESCO]

A symposium on water resources, use and management was organized by the Australian Academy of Science from 9 to 13 September 1963, in Canberra, in collaboration with UNESCO. The publication of the proceedings will be undertaken by the Australian Academy of Science with assistance from UNESCO. [UNESCO]

A sanitary engineer was seconded by WHO to the staff of the United Nations Water Resources Development Centre in March 1963. One of his first responsibilities was to assist the Centre in the preparation of a report to the Economic and Social Council relating to the United Nations Development Decade and containing proposals for a priority programme of co-ordinated action in the field of water resources. [WHO/WRDC]

Integrated river basin development

In October 1963 the nine riparian States of the Niger river basin (Cameroon, Chad, Dahomey, Guinea, Ivory Coast, Mali, Niger, Nigeria, Upper Volta) signed at Niamey a convention regarding navigation and economic co-operation in the Niger River Basin. In this agreement, provision is made for the establishment of a permanent inter-governmental organization which will be entrusted with the task of encouraging, promoting and co-ordinating the studies and programmes concerning the exploitation of the resources of the Niger River Basin. Observers from various United Nations organizations attended the meeting. [ECA/BTAO/UNRTD]

A meeting of experts of the four riparian countries (Guinea, Mali, Mauritania and Senegal) of the Senegal river basin was held in December 1963, in Nouakchott. Observers from the United Nations and FAO attended the meeting. [ECA/FAO/UNRTD]

The Committee for Co-ordination of Investigations of the Lower Mekong Basin, consisting of Cambodia, Laos, Thailand and the Republic of Viet-Nam, held its sixteenth (plenary) session in January 1962 at Phnom-Penh, its seventeenth session concurrently with the annual session of ECAFE in March 1962 at Tokyo, its eighteenth session in May 1962 at Bangkok, its nineteenth (plenary) session in January 1963 at Vientiane, its twentieth session concurrently with ECAFE's annual session in March 1963 at Manila, its twenty-first session in May 1963 at Bangkok and its twenty-second session in November 1963 at Saigon. The Committee was ahead of its schedule in carrying out its five-year programme of investigation and has already embarked on the construction of three multiple-purpose tributary projects in the lower basin. [ECAFE]

WHO continued to advise the Committee for Co-ordination of Investigations of the Lower Mekong Basin on the health aspects of the projects for the development of water resources in that area. [WHO/ECAFE]

Hydro-power resources

The first African Electric Power meeting was held in Addis Ababa from 21 to 31 October 1963. Delegates from more than twenty African countries attended. Some of the questions discussed were inter alia, legal aspects of hydroelectric utilization of international rivers, methods for determining the gross potential of hydroelectric resources and the use of very small hydroelectric units. [ECA/ECE/BTAO/UNRTD]

The Group of Experts for the Study of Hydro Electric Resources in Europe, which is a permanent subsidiary body of the Committee on Electric Power of ECE, held its thirteenth session on 26 and 28 September 1962. Following this session the Group's title was changed to "Group of Experts for the Study of Hydro Electric Resources in Europe and their Utilization". The fourteenth session was held on 27 and 28 May 1963 and the fifteenth session on 2 and 4 October 1963. All sessions took place in Geneva. [ECE]

The Committee on Electric Power of ECE held its twenty-first session at Geneva from 26 to 28 September 1962 and its twenty-second session from 2 to 4 October 1963. [ECE]

The ECAFE secretariat, in co-operation with BTAO, organized a panel of experts on rural electrification which, during the year 1962, visited fourteen countries in the ECAFE region to study the status and problems of rural electrification. The Sub-Committee on Electric Power (ninth session) met at Bangkok from 30 September to 7 October 1963. [BTAO/ECAFE]

Water supply problems

A seminar on the design of water supplies, attended by personnel from twenty-two countries, was held in Buenos Aires in September 1962. [WHO]

WHO sponsored a group meeting on community water supply from 13 to 17 November 1962 in Beirut. It was attended by twenty-two officials concerned with public water supplies in countries of the Eastern Mediterranean Region who discussed achievements in this field over the past three years, considered the financial,

legal and other problems involved, and suggested how further progress could be accelerated. From the discussions it became clear that one of the major handicaps in enabling community water supplies to keep pace with the growing population is the acute shortage of trained personnel. [WHO]

In 1963 the Regional Office for Africa discussed the community water supply programme in the African region and prepared a report on the present situation south of the Sahara, with recommendations for expansion of the programme. [WHO]

Community water supplies was the subject of the technical discussions held at the fifteenth session of the Regional Committee for Southeast Asia, held during September 1962, in New Delhi. The discussions were followed by recommendations on the organization of national or state water and drainage boards, inexpensive methods of collecting and distributing water, water quality standards, principles of financing, and other related matters. [WHO]

A post-graduate training course for ten French-speaking sanitary engineers was held from 10 January to 27 July 1963 in collaboration with the University of Naples. The course, specially oriented to fit the needs of WHO's programme of advisory assistance to developing countries, covered various aspects of sanitary engineering, including water supply and treatment, sewerage and sewage disposal. [WHO]

The advantages of joint community water supplies (i.e. water supplies from a common source serving a group of communities) were discussed at an inter-regional seminar held from 5 to 14 June 1963 near Varna, Bulgaria, where a number of schemes for furnishing water to small communities from a central source have recently been completed. Twenty-seven government officials responsible for community water supplies in countries of the African, European and Eastern Mediterranean Regions attended, and information was exchanged on the organization, financing, management and operation of this type of water supply development. [WHO]

"The influence of community water-supply programmes on health and social progress" was the subject selected for the technical discussions during the seventeenth World Health Assembly. An outline for discussing the various aspects of this subject was accordingly distributed in 1963 to all member States of WHO preparatory to the technical discussions to be held in March 1964. [WHO]

A regional seminar on water supply systems, attended by sixty-five engineers from various Latin American countries, was held in Buenos Aires, Argentina. [PAHO/WHO]

During 1962 a symposium on new methods of sewage treatment was held in Cincinnati, Ohio (USA), in collaboration with the Robert A. Taft Sanitary Engineering Center of the United States Public Health Service, the Agency for International Development, and the University of Cincinnati. The symposium was attended by ninety-nine engineers from all the countries of Latin America, from other regions, and a number of consultants from PAHO/WHO and other organizations. [PAHO/WHO]

A regional seminar on water supply systems, attended by thirty-four participants, was held in Sao Paulo, Brazil. [PAHO/WHO]

A regional seminar on water supply systems and hydraulic equipment was held in Mexico City, Mexico. [PAHO/WHO]

A regional seminar on ground-water resources development, with emphasis on geophysical exploration, was held in Trinidad. [PAHO/WHO]

A regional symposium on sewage and sewerage systems, attended by more than forty professionals, was held in Medellin, Colombia. [PAHO/WHO]

A regional symposium on plastic pipe utilization in water supply distribution systems was held in Caracas, Venezuela. More than sixty professionals attended. [PAHO/WHO]

Water pollution problems

The ECE secretariat, in co-operation with WHO, organized a travelling seminar on the Rhine between 30 September and 10 October 1962. This seminar, which was held on a boat travelling from Basle to Rotterdam, was attended by forty-five experts from seventeen European countries. [ECE]

In September 1962 a panel was convened to discuss radioactive waste disposal into the ground. The group assisted with the drafting of a technical publication which provides a scientific basis for evaluating ground disposal practice. The objective of the panel and its publication is to prevent pollution of ground-water resources. In October 1962 a conference was held on the treatment and storage of high-level radioactive wastes (STI/PUB/63). [IAEA]

Attendance at the Technical Commission on the Pollution of Surface Waters of the International Water Supply Association, held in Barcelona, Spain, 1-6 November 1962. [WHO]

Watershed management, irrigation and drainage

A symposium on the influence of irrigation on secondary salinization, and on the regime and chemical composition of ground water, was convened jointly by UNESCO and the Academy of Sciences of Uzbekistan in Tashkent (USSR) from 6 to 10 August 1962. In addition to a large number of Soviet scientists, experts from twenty other countries and two groups of UNESCO fellows, specialists in hydrogeology and in soil salinity, attended the symposium, at which some seventy papers were presented. Results of research on the causes and effects of primary and secondary soil salinity were exchanged, and field trips were organized to examine examples of the problem and ways of controlling it, particularly on the Hunger Steppe. [UNESCO]

A training course in plant physiology with special reference to problems of irrigated areas was organized in Algiers from 16 August to 9 September 1963 by UNESCO and the Government of Algeria. Thirteen trainees from Aden, Algeria, Cyprus, Ethiopia, Iran, Jordan, Qatar, Syria, Tunisia, Turkey and the Yemen participated. The course included lectures on the theory of mineral nutrition and the effects of salinity, and the experimental study of the water balance of plants in relation to environment which included practical work either in the laboratory or in the field. [UNESCO]

Hydrologic problems

A panel on isotope techniques for hydrology (STI/DOC/10/23) was convened in December 1962. It considered that isotope techniques could be applied to hydrological problems in the early stages of water resources development, where they provide information more rapidly than conventional methods. At more advanced stages of development, isotope techniques can complement conventional techniques and assist in the more complete assessment of the parameters which enter into water budget considerations. [IAEA]

A symposium on radioisotopes in hydrology (STI/PUB/71) was organized by IAEA in Tokyo in March 1963. The proceedings of this symposium reflect the current status of the application of isotope techniques. [IAEA]

A symposium on evaporation and evapotranspiration was organized by the International Association of Scientific Hydrology in collaboration with UNESCO. This meeting was held from 19 to 31 August 1963 at the University of California, (Berkeley, USA) in conjunction with the general assembly of the International Union of Geodesy and Geophysics. The proceedings have been published with UNESCO's assistance. [UNESCO]

The Fourth Congress of the World Meteorological Organization was held in Geneva in April 1963. The Congress gave detailed consideration to the organization's role in hydrometeorology and water resources development and adopted decisions through which its responsibilities in this field have been considerably extended. The terms of reference of the technical commission dealing with those problems have been redefined to meet the new responsibilities of WMO in water resources and hydrology and its name - Commission for Hydrological Meteorology - was changed to "Commission for Hydrometeorology". [WMO]

Arid and tropical zones

A symposium on continental erosion was organized jointly by UNESCO and the International Association of Scientific Hydrology. This meeting was held from 1 to 6 October 1962 in Bari (Italy). Eighty-five scientists from fifteen countries attended, and fifty papers were presented at sessions grouped into seven sections covering erosion and cartography, basic research and analysis of continental erosion, general research on continental erosion, special types of erosion, transport of solid material, transport of solid material and sedimentation in reservoirs, and erosion control. The proceedings have been published with UNESCO's assistance. [UNESCO]

The Scientific Conference on the Arid Regions of Latin America, which was organized by UNESCO in collaboration with the Argentine authorities and the "arid lands committees" of Latin American member States, took place in Buenos Aires from 16-21 September 1963. The Conference provided an audience of 600 participants from thirty-one countries with up-to-date information on the state of knowledge in the various aspects of arid zone research and conveyed to the Latin American specialists experience acquired in other parts of the world, particularly through the UNESCO Arid Zone Major Project. The Conference also adopted resolutions to the effect that a Latin American council for co-ordination and promotion of arid lands be established and that the UNESCO Latin American Science Co-operation Office be entrusted with its secretariat. [UNESCO]

The prospection and evaluation of ground-water resources was the subject of another training course, held in Antofagasta (Chile) from 30 September to 26 October 1963. Attending the course were twenty-six participants from Latin American countries having problems of aridity (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru and Venezuela). Lectures and practical work were concerned with the following subjects: basic principles of hydrogeology; hydrogeological investigations in arid zones; quantitative methods in solving problems related to resources and flow of ground water. Several half or whole-day excursions were made in the surroundings of Antofagasta. A three-day field trip was organized into the Atacama Desert to explore the hydrogeological potential of the oasis of San Pedro de Atacama. [UNESCO]

Desalination of sea and brackish water

In 1963, two panels of experts were convened on the use of nuclear energy for saline water conversion. The first related to the general status of desalination - the second to the different possible schemes of nuclear conversion plant. A certain emphasis was put on dual-purpose installations. [IAEA]

B. RESEARCH AND STUDIES

This section generally covers only research and studies other than those having already resulted in publications listed in section C. Furthermore, it is to be noted that some of the Special Fund projects mentioned in Chapter II and some of the other operational projects listed in section D include research and studies, in varying degrees.

Water resources development (general)

A "Manual of Standards and Procedures for Investigation and Planning of Water Resources Development Projects" was prepared for publication in early 1964. The objective of the Manual is to assist in achieving uniformity in water resource investigations and in the presentation of plans for development; and to ensure the adequacy and reliability of information submitted to Governments and financing agencies in support of requests for project approval and development funds. It sets forth acceptable standards for basic data, guidelines for conducting adequate project investigations and procedures and criteria to be followed in the formulation and appraisal of plans. The final draft incorporated many valuable suggestions and comments contributed by various national organizations dealing with water resources development as also the United Nations organizations and agencies. [ECAFE]

A preliminary comparative study has been initiated of water codes in the ECAFE region with a view to suggesting principal subjects to be included in a model code for use in the region. It is envisaged that a working party may be convened in 1965 to examine the question in detail with a view to framing the principal subjects of a model code. [ECAFE]

A comparative study has been taken in hand of cost of water resources development projects, including relative costs for different methods of construction. It is realized that the costs of water projects are bound to vary

from country to country because of local differences in such matters as cost of labour and materials. However, it was felt that a comparative study and proper analysis of representative water projects in various fields of water resources development could reveal the factors affecting such differences, and would provide the planner and administrator with a useful guide in making project appraisal. The results of the analysis will be presented as a preliminary report for consideration by the Sixth Regional Conference on Water Resources Development in November 1964.

[ECAFE]

Integrated river basin development

Preparation has been initiated of a compendium on international rivers in the ECAFE region, based on information being gathered from maps, meteorological and hydrological data and project reports. The purpose is to put together available data in a systematic form and to identify, as far as possible, the possibilities of development. When opportunities occur, arrangements may be made for joint action by the riparian countries in the form of a common programme of data collection, a reconnaissance survey of the river and, eventually, the preparation of development plans. [ECAFE]

Hydro-power resources

In the field of those aspects of water resources which influence hydro-power development, research and studies under the normal work programme are in an advanced stage of preparation in the following subjects: (a) extension of the geographical coverage, so as to include areas not so far covered, of a European survey of gross surface hydro-electric potential determined and mapped on a common basis; (b) basic study of seasonal and other characteristics, including inter-basin diversity and year-to-year fluctuations, of stream-flow conditions which determine hydro electric resources. This study, also intended to include a methodological section, is designed to complement the survey referred to under (a) immediately above; (c) general analysis and assessment of hydro storage possibilities in European countries and their future role in Europe. In addition to the above, data collection and analysis are carried on regularly in respect of hydro power. Regular annual surveys of the electric power situation and prospects in Europe and also a regular half-yearly bulletin on hydraulic conditions are prepared and include such data and analyses (see under section C below). [ECE]

A large-scale study on African hydro-power resources was prepared for the ECA African Electric Power Meeting held in Addis Ababa in October 1963. [ECA/ECE]

A report of the comprehensive evaluation of hydro-electric resources was one of a series prepared for the same ECA African Electric Power Meeting held in Addis Ababa in October 1963. [ECA/ECE]

Water supply problems

A questionnaire was sent to all member States of WHO in the European Region with a view to assessing the practicability of applying European standards for drinking-water, published by the organization in 1961. The results were analysed by a WHO consultant. [WHO]

Analytical methods and procedures for assessing river water quality were considered in 1962 by the Expert Committee on International Standards for Drinking Water. The 1958 Standards were revised and a new section was added on standards of quality for water sources to be used for water-supplies. It was emphasized that neither the standards themselves nor the laboratory methods should be considered as static or final; they should be under continual study and should be modified in line with the most recent advances in water technology (see also section C. below). [WHO]

Water pollution problems

The ECE secretariat continued to study, where appropriate in co-operation with the secretariats of FAO, WHO and IAEA, legal/administrative, economic and technical problems in the field of water pollution control in Europe. A directory of water pollution research laboratories in Europe, containing information about the research programmes of these laboratories, is being established in co-operation with the secretariat of the OECD. [ECE]

The IAEA established study groups to assist with the preparation of manuals or codes of good practice designed to prevent pollution of water supplies by radioactive contamination. In 1963 the publication Disposal of Radioactive Wastes into Fresh Water (IAEA publication, Safety Series No. 10) was issued. A similar document on "Radioactive Waste Disposal into the Ground" is in preparation. Similar studies were also performed to elaborate treatment processes for removing radioactive contamination from waste waters. [IAEA]

To follow up the ECE/FAO/IAEA/WHO conference on water pollution problems in Europe, held in Geneva in 1961, a WHO consultant, during two periods in 1962, made a study of various aspects of these problems, including water virology and resistance to disinfection methods currently in use. [WHO]

In 1962, WHO also assisted ECE in organizing a travelling seminar on the Rhine designed to study water pollution in an international river, and provided a consultant for the duration of the seminar to direct the discussions on health aspects. [ECE/WHO]

Watershed management, irrigation and drainage

The preparation of the International Sourcebook on Irrigation and Drainage progressed satisfactorily. Following the meetings of the Editorial Group in Nimes (France), Moscow and Tashkent (USSR) in 1962 and Davis, (California, USA) in 1963, a number of additional authors were contracted. The chapters received were translated and circulated as working documents, for comments, to suitable experts. The broad collaboration brought to this subject by specialists working on various conditions and through the exchanges of views which have taken place, leads to a synthesis of the knowledge and experience gained throughout the world. [FAO/UNESCO]

Hydrologic problems

In collaboration with WMO, questionnaires on hydrologic data were jointly drafted. These were sent to member States of ECA as well as the representatives

of WMO in Africa. Upon receiving the answers of the African Governments the data will be analysed and a report will be prepared. [ECA/WMO]

Facilities have been installed in the IAEA's laboratories for the enrichment and measurement of tritium in natural waters. The equipment is now being used for the routine analysis of precipitation and ground-water samples in connexion with the solution of hydrological problems. Through the letting of research contracts the use of isotope techniques is being applied to stream gauging, siltation, the measurement of the velocity and direction of ground-water movement, tracing of ground-water flow, the use of tritium and C-14 in ground-water research and the development of improved methods for the enrichment and counting of tritium. Several research contracts in the category of radioactive waste management and environmental studies are investigating the fate of radioactive waste materials reaching streams. Such projects include investigations of radioisotopes assimilated by biological organisms and absorbed on sediments and suspended solids. [IAEA]

Preparations were made for a long-term international research programme in the field of scientific hydrology. Taking into account the suggestions made during the meeting of a small committee of experts held in November 1962, UNESCO formulated proposals for an International Hydrological Decade. These proposals, circulated to all member States, formed the working document of the preparatory meeting of experts held in May 1963, the purpose of which was to outline the programme of the International Hydrological Decade, to determine the steps necessary for the progressive development and execution of this programme from 1965 onwards, and to study the means of implementing it on the national and international levels. Following comments received from member States, a second working document is being prepared for submission to the Inter-governmental Meeting of Experts on Scientific Hydrology which will take place in April 1964. [UNESCO]

Arid and tropical zones

A mission of three experts visited the United Arab Republic, Sudan, Chad, Niger, Mali, Mauritania, Morocco, Algeria, Tunisia and Libya in order to initiate the project for study of the artesian basins of north Africa. Preliminary discussions took place concerning the organization of an inter-governmental conference of representatives of the interested States which is to be the second step of this project and will be held in 1964. [UNESCO]

The study of the agroclimatology of arid and semi-arid zones of the Near East was successfully completed and, following the interest which this project aroused, preparations were made to extend the study to the Sahelian belt of Africa. [FAO/UNESCO/WMO]

Desalination of sea and brackish waters

As a major part of the survey on water desalination in developing countries two consultants and two staff members visited forty-three countries on a fact-finding mission. The report will include a general part summarizing the findings and the economic aspects of desalination as well as forty-two country reports and appendices. [UNRFD]

C. PUBLICATIONS

Natural Resources Newsletter

During 1963 ECA started the publication of this newsletter on developments in Africa, covering, among other things, water resources. Up-to-date information on events happening in Africa and also in other parts of the world, if they have a bearing on African problems, is being published regularly. [ECA]

Case study of the comprehensive development of the Kitakami river basin (JAPAN)

This study analyses the water plan for the development of the Kitakami river basin, and discusses the methods and procedures used in co-ordinating the planning and execution of the programme of development and of the economic impact of the programme on the basin since its launching in 1953. A comparison is also made of the Kitakami, the Tennessee and the Damodar development programmes. (ST/ECAFE/SER.F/20) [ECAFE]

Proceedings of the Regional Symposium on Dams and Reservoirs

Transactions of the Regional Symposium on Dams and Reservoirs, held in September 1961 at Tokyo, as well as technical papers presented at the meeting. (ST/ECAFE/SER.F/21) [ECAFE]

Field methods and equipment used in hydrology and hydrometeorology

Transactions of the Second Interregional Seminar on Field Methods and Equipment Used in Hydrology and Hydrometeorology held jointly by ECAFE and WMO at Bangkok in November/December 1961. It also reproduces the technical papers contributed to the Seminar. (ST/ECAFE/SER.F/22) [ECAFE]

Proceedings of the Regional Seminar on the Development of Ground-water Resources with Special Reference to Deltaic Areas

Transactions of the Regional Seminar on the Development of Ground-water Resources with Special Reference to Deltaic Areas, held in April/May 1962 at Bangkok, together with technical papers presented at the Seminar. (ST/ECAFE/SER.F/24) [ECAFE]

Proceedings of the Regional Symposium on Flood Control, Utilization, Reclamation and Development of Deltaic Areas

Transactions of the Regional Symposium on Flood Control, Utilization, Reclamation and Development of Deltaic Areas, together with technical papers presented at the Symposium. (ST/ECAFE/SER.F/25) [ECAFE]

Water Resources Journal

Issued since 1950, this mimeographed quarterly journal gives up-to-date information on water resources development projects and activities in Asia and

the Far East, other technical data of particular interest to the countries in the region and annual damage caused by typhoons, floods and droughts. [ECAFE]

Water resources development

The ECE secretariat issued a report (E/ECE.472 and addenda) on the role of the Economic Commission for Europe in the field of the rational utilization of water resources in Europe. [ECE]

Travelling seminar on the Rhine on water pollution control problems

The report of this seminar, which was held from 30 September to 10 October 1962, and the lectures delivered during the seminar, were issued as separate documents (Water Poll/Sem. 4 and 5). [ECE]

A compendium of information and documentation on various aspects of water pollution control in Europe was brought up to date (Water Poll/Gen.1). [ECE]

Half-Yearly Bulletin on Conditions of Hydraulicity in Europe (United Nations, Geneva - latest issue, vol. 5 No. 1, December 1963)

Issued in offset and mimeographed form (starting in 1959), with regular map, provides stream flow data and indices established on a common basis for a wide selection of European river basins, and of use in various water fields. [ECE]

The Situation and Prospects of Europe's Electric Power Supply Industry in 1960/61 (United Nations, Geneva, 1962)

Issued in 1962 as ST/ECE/EP/11, United Nations publication, Sales No.: 62.II.E/Mim. 9. [ECE]

The Situation and Future Prospects of Europe's Electric Power Supply Industry in 1961/62 (United Nations, Geneva)

Issued in 1963 as ST/ECE/EP17, United Nations publication, Sales No.: 63.II.E/Mim. 5. [ECE]

The following study was prepared by the secretariat of the Energy Division at the request of the Economic Commission for Africa, taking into account basic information received from member countries of ECA:

The Situation, Trends and Prospects of Electric Power Supply in Africa

This report will be issued in the first half of 1964 as a printed publication under the auspices of ECA. [ECE]

Evaluation of existing hydraulic resources and requirements (E/CONF.39/A/209)

A report was prepared by the secretariat for the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas, held at Geneva in February 1963. [ECE]

Evaluation of Foreseeable Energy Requirements (E/CONF.39/A/119)

A second companion report on different economic questions was prepared as a series of documents for the Conference. [ECE]

Water Resources in Latin America: III - Bolivia and Colombia

This document illustrates the important role of water resources in the economic and social development of both countries, presently and in the future. General guidelines and recommendations for an optimum development of water resources are given (E/CN.12/695). [ECLA/BTAO]

Progress of water resources survey in Argentina (E/CN.12/625) [ECLA/BTAO]

Natural and water resources in Latin America

An inventory of existing resources and evaluation of experience acquired in Chile, Ecuador, Venezuela, Bolivia and Mexico by a group of experts. [ECLA/BTAO/WMO]

Study on electricity in Latin America

Report on the Latin American seminar on electricity, held in Mexico in 1961, including hydro-power resources and their development. First volume issued (576 pages). [ECLA/BTAO/RTEB]

Disposal of Radioactive Wastes into Fresh Water

This publication was issued in 1963 as Safety Series No. 10. [IAEA]

Desalination of Water Using Conventional and Nuclear Energy

A report on the present status of desalination and the possible role nuclear energy may play in this field. Technical Reports Series No. 24 [IAEA]

Problems of the Arid Zone

Proceedings of the Paris symposium held in May 1960, published in the Arid Zone Research Series (vol. XVIII). Papers are grouped in four sections: state of scientific knowledge; action undertaken; socio-economic problems of development; future of arid zone research. Many pages deal with the various aspects of the water problem in arid zones. [UNESCO]

Changes of climate

Proceedings of the Rome symposium on changes of climate. Changes during the period of meteorological records; changes during the late geological and early historical records; theories of climate; the significance of changes of climate; conclusions. Bilingual: English/French. [UNESCO/WMO]

Ecological map of the Mediterranean Region

1/5,000,000 bioclimatic map of the Mediterranean Region in two sheets, each 45" x 31", printed in full colour, based on analysis of climatic factors, including temperature and precipitation. Accompanied by four 1/10,000,000 maps of homologous regions in small format and explanatory brochure. [FAO/UNESCO]

Arid Zones

A quarterly newsletter about UNESCO's programme on scientific research relating to natural resources, particularly in arid regions. [UNESCO]

Hydrogeological maps

Following a meeting on hydrogeological maps, organized jointly by UNESCO and the International Association of Scientific Hydrology, agreement was reached on the standardization of legends and lay-out of hydrogeological maps. The standardized legend was published and distributed (NS/NR/20). [UNESCO]

Bulletin of the World Health Organization

1962, vol. 26, no. 4 is devoted to contributions selected from among the working papers presented at various meetings convened or co-sponsored by WHO, which involved water-supply activities. [WHO]

Aspects of Water Pollution Control

Published in 1962 as Public Health Paper No. 13, this selection of papers, prepared by various authors for the Conference on Water Pollution Problems in Europe, held at Geneva in 1961, includes chapters on the financial, economic, legislative and administrative aspects of water pollution control. [WHO]

A definitive monograph on the operation and control of water treatment processes was completed by a WHO consultant and will be published early in 1964. [WHO]

Urban Water Supply Conditions and Needs in Seventy-five Developing Countries

A study, by Bernd H. Dieterich and John M. Henderson, published in 1963 as Public Health Paper No. 23, of present urban water supplies and future needs in a number of countries regarded as being representative of the developing parts of the world. This comprehensive analysis was undertaken to provide the basic data for the global Community Water Supply Programme of WHO. [WHO]

International Standards for Drinking Water

This second edition, published in 1963, contains proposed bacteriological, chemical, physical and biological requirements for, and the maximum permissible radioactive content of, domestic water supplies. The relevant methods of water analysis (including many additional tests not given in the first edition) are fully described in annexes. (See also section B. RESEARCH AND STUDIES, above.) [WHO]

WMO Bulletin

A quarterly publication in two separate editions, English and French, containing numerous articles and reports of interest to both meteorologists and hydrologists. [WMO]

Report on isotope techniques for hydrology

Issued in 1963 as STI/DOC/10/23 following a panel of experts held in December 1962. [IAEA]

Proceedings of a symposium on radioisotopes in hydrology

Issued in 1963 as STI/PUB/71 following a symposium held in Tokyo in March 1963. [IAEA]

D. TECHNICAL AND FINANCIAL ASSISTANCE

This section covers services of experts, fellowships, equipment, grants and loans, presented by region and country in alphabetical order. The various items are numbered and cross-classified below according to ten substantive groups. The groups, together with the cross-reference item numbers (some of which appear under several of the groups) are as follows:

I. Survey and appraisal of water resources (including ground and surface waters)

1, 2, 3, 4, 5, 6, 10, 12, 13, 15, 15a, 19, 23, 25, 27, 29, 34, 47, 49, 55, 57, 63, 65, 67, 68, 70, 71, 74, 75, 78, 81, 86, 88, 89, 90, 91, 92, 94, 99, 100, 105, 106, 107, 112, 116, 118, 123, 124, 125, 127, 128, 129, 134, 135, 136, 137, 139, 140, 145, 147, 148, 149, 153, 155, 156, 160, 168, 169, 179, 180, 182, 184, 189, 191, 192, 193, 195, 201, 205, 210, 214, 218, 219, 220, 238, 239, 240, 241, 245, 246, 247, 256, 266, 267, 269, 270, 275, 279, 280, 291, 294, 298, 300, 301, 302, 304, 305, 307, 311, 319, 320, 321, 324, 326, 337, 339, 340, 346, 347, 348, 356, 357, 360, 361, 362, 365, 368, 374, 379, 380, 392, 394, 397, 403, 407, 413, 425, 426, 433, 437, 438, 441, 448.

II. Water supplies (town, rural and industrial)

2, 5, 7, 16, 17, 21, 26, 27, 36, 37, 39, 44, 48, 49, 50, 51, 56, 64, 66, 68, 72, 73, 76, 77, 82, 88, 90, 91, 100, 102, 107, 117, 118, 126, 127, 133, 139, 142, 145, 149, 150, 154, 155, 156, 160, 162, 163, 167, 173, 174, 175, 177a, 178, 183, 185, 191, 192, 193, 195, 199, 200, 201, 204, 209, 213, 216, 219, 225, 229, 230, 232, 233, 235, 239, 240, 241, 242, 251, 252, 257, 267, 275, 276, 279, 281, 287, 288, 291, 297, 306, 309, 310, 312, 313, 321, 325, 327, 328, 329, 334, 335, 336, 340, 342, 343, 344, 345, 347, 348, 351, 352, 353, 354, 355, 356, 360, 363, 364, 369, 370, 371, 372, 373, 377, 378, 379, 380, 381, 382, 383, 385, 388, 389, 390, 391, 392, 395, 396, 401, 402, 403, 404, 405, 408, 409, 410, 412, 417, 418, 419, 425, 426, 429, 432, 433, 435, 436, 437, 441, 444, 445, 446, 447, 452, 456.

III. Water pollution control

17, 160, 163, 175, 206, 228, 246, 277, 279, 283, 287, 288, 310, 342, 359, 364, 386, 395, 396, 399, 403, 447, 452, 453, 454, 455.

IV. Irrigation, drainage and reclamation

2, 3, 4, 5, 9, 10, 11, 12, 14, 19, 24, 29, 32, 33, 42, 45, 46, 53, 59, 62, 63, 68, 69, 70, 75, 81, 88, 91, 94, 95, 96, 97, 98, 100, 101, 107, 108, 110, 114, 115, 119, 122, 123, 125, 127, 130, 131, 132, 138, 139, 141, 143, 145, 147, 153, 155, 156, 157, 160, 161, 170, 171, 175, 182, 184, 186, 187, 191, 192, 193, 194, 195, 198, 202, 206, 208, 211, 212, 214, 218, 221, 224, 226, 228, 238, 239, 240, 241, 244, 246, 248, 249, 250, 253, 254, 257, 260, 261, 264, 265, 267, 268, 271, 279, 280, 290, 291, 292, 293, 295, 301, 305, 321, 322, 323, 332, 339, 340, 347, 349, 367, 374, 392, 394, 407, 416, 422, 423, 424, 429, 441, 442, 450.

V. Soil and water conservation (headwater control and watershed management)

2, 3, 4, 5, 10, 20, 29, 41, 46, 63, 68, 75, 88, 91, 99, 100, 119, 123, 127, 139, 143, 145, 147, 153, 155, 156, 158, 159, 160, 161, 182, 186, 187, 191, 192, 195, 198, 201, 203, 211, 214, 218, 226, 227, 241, 246, 248, 254, 257, 267, 291, 301, 311, 321, 322, 339, 340, 347, 349, 374, 392, 407, 429, 441, 442, 450.

VI. Hydro-power projects

1, 2, 3, 4, 5, 18, 35, 75, 91, 93, 127, 143, 145, 147, 152, 153, 155, 156, 158, 160, 164, 165, 172, 201, 215, 217, 231, 248, 274, 281, 284, 296, 303, 311, 321, 337, 340, 341, 347, 348, 375, 376, 384, 392, 398, 415, 429, 430, 441, 443, 451.

VII. Multi-purpose water development

1, 2, 3, 4, 5, 8, 10, 13, 18, 22, 29, 40, 63, 68, 75, 91, 92, 94, 100, 127, 143, 145, 147, 153, 155, 156, 160, 191, 201, 214, 220, 246, 248, 291, 311, 317, 318, 321, 339, 340, 347, 348, 349, 392, 411, 429, 441, 442.

VIII. Establishment and development of networks of meteorological and hydrological stations and relevant services

2, 10, 30, 38, 111, 127, 146, 151, 152, 156, 160, 176, 182, 197, 223, 243, 255, 272, 273, 298, 321, 340, 347, 348, 406, 434, 441.

IX. Desalination of sea and brackish waters

28, 31, 43, 52, 58, 60, 61, 79, 83, 84, 85, 87, 103, 104, 105, 109, 120, 121, 144, 166, 177, 181, 188, 190, 196, 207, 222, 234, 236, 237, 259, 263, 278, 281, 285, 286, 287, 289, 299, 314, 315, 316, 330, 331, 338, 358, 366, 393, 414, 420, 421, 440, 449, 457, 458.

X. Water resources management (water authorities, boards and commissions, water legislation)

7, 12, 15, 37, 44, 51, 54, 73, 80, 86, 89, 112, 113, 133, 134, 163, 180, 182, 200, 210, 230, 233, 243, 254, 258, 262, 270, 308, 319, 321, 322, 333, 342, 347, 350, 385, 387, 389, 400, 403, 427, 428, 431, 433, 436, 439, 445, 446, 456.

Africa

Regional

1. A consulting firm was chosen and completed a survey of the repercussions and potentials of development on the Niger River and other assistance was given towards integrated river basin development. [BTAO/UNRTD]
2. Assistance was given in several stages, including a mission of eleven experts in 1962-63, regarding the Senegal River basin, at the request of the riparian countries, Guinea, Mali, Mauritania and Senegal. [BTAO/UNRTD]
3. Two water experts assisted Dahomey and Togo in carrying out a preliminary reconnaissance and preparation of a request for an integrated basin survey of the Mono River. [BTAO/UNRTD]
4. In June 1963 an integrated basin survey of the Mono River was approved by the Special Fund. The purpose of the project is to undertake a feasibility survey of the hydraulic development of the Mono River basin and to carry out power market surveys in Dahomey and Togo. This project will be carried out in two years at a cost of \$783,500, of which \$633,500 will be contributed by the Special Fund [SF/UN]
5. A regional water resources adviser assisted in planning and implementing regional hydrology and other water activities. [BTAO/ECA]
6. The Director of the Resources and Transport Branch visited Dahomey, Togo, Niger, Guinea, Mali, Mauritania and Senegal, and consulted with Governments on development of water resources. [UNRTB/BTAO]
7. Assistance in the administration of water and electricity was provided to Rwanda and Burundi. [BTAO/UNRTD]
8. In 1962 and 1963 six fellowships were awarded in various water development fields. [BTAO/UNRTD]
9. A primary survey of the existing facilities and needs for training middle grade hydrologists was carried out in the eastern sub-region of Africa (ECA). This was followed by a visit of an expert in irrigation who was commissioned by FAO to cover the same territory. It is hoped that both studies will lead to the establishment of a training centre for middle grade hydrologists and irrigation staff in east Africa. [ECA/FAO]
10. A three-man mission, composed of a hydrometeorologist (WMO), a hydrologist (WMO) and a swamp reclamation expert (FAO), carried out further studies in the Lake Victoria basin. [FAO/WMO]
11. Assistance was given to the Governments of Kenya, Tanganyika and Uganda in the preparation of a programme for training in the fields of irrigation and hydrology. [FAO]
12. A senior hydrologist participated in discussions with the representatives of the countries bordering Lake Chad to examine the setting up of a committee for the joint study of the water resources of the basin. [FAO]

13. A water development specialist assisted in the preparation of plans for the survey of the Senegal River basin. [FAO/UNTAO/WMO/WHO]
14. Short-term assistance was given to Sudan, Tanganyika and Uganda in the planning of irrigation research. [FAO]
15. A regional expert was assigned to the Cairo office to advise the countries of the Near East Region on problems of water resources and development. [FAO]

Algeria

- 15a. A small-scale water development expert was recruited for assistance to the Government. [FAO]
16. Activities connected with water supply, sewerage and sewage disposal were included in the environmental sanitation programme started in 1963. [WHO]
17. Two one-month fellowships, in water pollution and in waterworks and sewage disposal, were awarded in 1962 [WHO]

Basutoland

18. An expert in multi-purpose water resources development was provided for advice on hydro-power and other water development. [BTAO/UNRTD]

Bechuanaland

19. Short-term assistance was given in the preparation of a request to the Special Fund for assistance in the fields of hydrology, ground-water and irrigation development. [UNTAO/FAO]

Burundi

20. An expert visited Burundi and Congo (Leopoldville) to analyse the cause of the high flood levels in Lake Tanganyika which occurred early in 1963 and to advise on the measures to be taken. [BTAO/ECA]
21. A sanitary engineer of the team sent to Burundi in June 1962 to assist in the setting up and maintenance of public health services included in his activities the planning of water supply and sewerage projects. [WHO]

Cameroon

22. Experts in the fields of river navigation and hydrology were provided in 1962 and 1963. [BTAO/UNRTD]

Congo (Brazzaville)

23. An allocation of \$564,300 was made in 1963 for the survey of the water resources of the Niari Valley. The project will start early in 1964 and will be carried out by a consulting firm. [SF/FAO]

Chad

24. A group of three consultants prepared a report to advise the Government on the development of the Casier A, near Bongor. As a result of this work, another contract was prepared for the detailed design of an irrigation network. Operations under this contract will start early in 1964. [FAO]

Dahomey

25. Assistance was rendered in the fields of hydrogeology and hydrology. [BTAO/UNRTD]

26. Well construction equipment, pumps and piping have been provided as part of the programme to establish water supply services through self-help activities [UNICEF/WHO]

27. A sanitary engineer assigned in October 1961 made recommendations for a project which will provide for a complete water system for the city of Porto Novo, including a treatment plant. The Government has asked for similar assistance with regard to Cotonou. WHO staff have visited Dahomey to discuss the assistance that will be required and will provide the services of a consulting engineering firm to prepare preliminary engineering and feasibility reports, as well as the services of a short-term consultant on the development of ground-water. A two-year fellowship in sanitary engineering was awarded in 1962. [WHO/UNICEF]

Ethiopia

28. A water desalination expert on short mission. [UNRTD]

29. The survey of the Awash River basin continued. [SF/FAO]

30. A fellowship of twenty-two months' duration was provided for training in hydrometeorology. [WMO]

French Somaliland

31. A water desalination expert on short mission. [UNRTD]

Ghana

32. Mission of three experts to evaluate and advise on irrigation and other aspects connected with the Volta River project. [BTAO/FAO]

33. Topographical surveys, soil surveys and planning for irrigation and drainage to improve land use in the Volta Flood Plain were completed and a final report published. [SF/FAO]

34. The land and water survey in the Upper and Northern Regions started in October 1962. [FAO/SF]

35. A loan of \$47 million was made for the Volta River hydroelectric scheme which ranks with the largest undertakings of its kind anywhere. The dam will rise 370 feet above its foundations and have a crest length of over 2,000 feet, creating a reservoir about 300 miles long with a surface area of 3,275 square miles. The power station will have an initial capacity of 589,000 kilowatts. IBRD's loan was part of an international financing programme that will make possible construction not only of the dam and power station but also of an aluminium smelter which will be the largest single consumer of Volta power. Additional financing for the power project is being provided by United States Government agencies (\$37 million), the United Kingdom (\$14 million) and Ghana (\$98 million). [IBRD]

36. Assistance was provided by the resident sanitary engineer, from 1958 to October 1963, in general environmental sanitation, including community water supplies. [WHO]

37. Acting on the report of the team of advisers in sanitary engineering, public finance and public works, and municipal management, that visited Ghana in October 1960, the Government has agreed to set up a national water and sewerage authority. Under the plan approved by the Special Fund, WHO has provided the assistance of a resident sanitary engineer since October 1963, as well as the services of a consultant engineering firm for the preparation of a master plan for water supply and sewerage for the Accra-Toma Metropolitan Area. The first phase of the plan for water supplies is intended to increase the capacity of the system from nineteen million gallons a day to forty million gallons - the estimated requirements of the area for 1970. Fellowships are being provided for the training of Ghanaian engineers in water supply and sewerage systems. [SF/WHO]

38. Expert services for a period of fifteen months (from September 1963) were provided to assist in the organization of the existing meteorological network and to advise on the collection and processing of all available climatological and hydrological data. [WMO]

Guinea

39. Activities in community water supplies were begun in 1962 as part of the environmental sanitation programme carried out since September 1960. [WHO/UNICEF]

40. Experts were provided in hydrogeology and multi-purpose water development. [BTAO/UNRITD]

Ivory Coast

41. The services of a civil engineer specializing in the construction of earth dams were continued in 1962. [BTAO/UNRITD]

42. Assistance was given in the field of surface water development and irrigation, with special reference to the development of rice crops under irrigation. [FAO]

Kenya

43. A water desalination expert on short mission. [UNRITD]

44. Assistance was given to the Government in setting up a water authority for rural water supply. [WHO/FAO]

45. An allocation of \$887,700 was made in June 1963 for the survey of the irrigation potential of the Lower Tana River basin. Work commenced on 1 August 1963. A preliminary mission was sent to the country in June/July in order to carry out a reconnaissance survey for the choice of the most suitable 600,000 acres for further studies. [SF/FAO]

46. Under Contingency Fund allocation, a team composed of one soil scientist, one hydrologist and one irrigation and flood control engineer started work on the assessment of the agricultural potential of the Turkana District in November 1963. [FAO]

47. Radioactive tracers are being used to study the ground-water down gradient of a lake in Kenya with the aim of ascertaining whether there is a direct connexion between the lake and a number of springs and also to determine the turnover rate of water in the lake which has no visible inlets or outlets. [IAEA]

48. A sanitary engineer was assigned in September 1960 to environmental sanitation projects which include community water supplies. [WHO/UNICEF]

49. Three consultants were provided by WHO and one by FAO from March to May 1963 to advise on the development, financing, operation and management of water supplies for agricultural and domestic purposes. The report and recommendations of these consultants is under consideration by the Government. [WHO/FAO]

Liberia

50. Well construction and water distribution networks form part of the demonstration area between Kakata and Salala, and a programme of water supplies to other parts of the country has been prepared. [UNICEF/WHO]

51. Provision of a consultant in March 1962 to make a technical, organizational and economic study of the Monrovia water supply system, and another in April and May 1963 to make recommendations on the management of the system and to assist the Government in organizing a Water and Sewerage Division in the Public Utilities Authority established at the beginning of 1963. WHO also provided the services of a consulting engineering firm to prepare a preliminary engineering and feasibility report on the expansion of the Monrovia water supply system. [WHO]

Libya

52. A water desalination expert on short mission. [UNRTD]

53. Assistance was given in the field of water utilization under Funds-in-Trust as part of the tribal land settlement project in Cyrenaica. [FAO]

54. Assistance was given to the Government in advising on water legislation. [FAO]

Madagascar

55. A survey of the mineral and ground-water resources of southern Madagascar was approved by the Governing Council of the Special Fund in June 1963. The purpose

of the survey is to assess the mineral resources of the Horombe Plateau and the ground-water potential of the south-western region of the country. The project will be undertaken in three years at a cost of \$1,561,800, of which \$1,435,200 is contributed by the Special Fund. [SF/UN]

56. Action on community water supplies was started during 1962, following up the recommendations of a team of experts which visited the country in 1961. Plans are being made for securing the assistance of a consultant engineer to advise the Government on further steps to be taken to ensure the provision of water supplies to several communities. [WHO]

Mali

57. Experts in the fields of hydrology and hydrogeology were provided. [BTAO/UNRTD]

58. A water desalination expert on short mission. [UNRTD]

59. An allocation of \$1,013,000 was made in May 1962 for the improvement and expansion of rice growing lands. The project is not yet operational. [SF/FAO]

Mauritania

60. A water desalination expert on short mission. [UNRTD]

Morocco

61. A water desalination expert on short mission. [UNRTD]

62. Assistance in the fields of irrigation, hydrology and water development was given to the rural economic pre-investment project for the western Rif. [SF/FAO]

63. An allocation of \$1,126,200 was made in January 1963 for the integrated economic plan for the agricultural development of the Sebou Region. The project includes assistance in hydraulic engineering, hydrogeology, topography and dam site selection. [SF/FAO]

64. A consultant was assigned to Morocco during September 1962 to assist in drawing up a programme for community water supply development. [WHO]

Niger

65. A water resources adviser and experts in hydrology and hydrogeology were provided. [BTAO/UNRTD]

66. Assistance was given for the preparation of small-scale rural water supply schemes. [FAO]

67. Short-term assistance was given to the Government in the evaluation and preparation of a project for ground-water development for livestock for submission to the Special Fund. [SF/FAO]

Nigeria

68. The soil and water resources survey of the Sokoto Valley started in 1962. Hydrological studies are well advanced. Tentative proposals for the control of the floods and the storage of water for various purposes were prepared and are to be discussed with the Government. [SF/FAO]
69. Assistance was given to the Government in the assessment of the Zamfara Valley for irrigation development. [FAO]
70. A water resources expert was sent to Nigeria as a member of the agricultural mission to advise the Government on the general planning of the agricultural resources. [FAO]
71. Assistance in surveying ground-water resources of certain areas of the country was continued in 1962 and 1963. [BTAO/UNRTD]
72. A sanitary engineer began in July 1963 to advise on environmental sanitation work, including the provision of rural piped water supplies, in the Igala Idoma plateau of Northern Nigeria. A nine-month fellowship for sanitary inspection was awarded in 1963. [WHO/UNICEF]
73. WHO provided a consultant sanitary engineer from June to September 1962 as a member of the United Nations Technical Assistance Operations Planning Team to advise on the development of Lagos, including water supplies and sewerage. [WHO]

Nyasaland

74. Assistance was given in preparing a programme of bore-hole development under FFHC funds. [FAO]

Rhodesia

75. The Kafue River Basin project became operational in August 1962. Surveys of hydrology, water storage and water control have been carried out. [SF/FAO]

Senegal

76. A programme to improve environmental sanitation conditions, including community water supplies, has been carried out since July 1960. [WHO/UNICEF]

Sierra Leone

77. The provision of piped water supplies has been included in a long-term environmental sanitation programme in operation since November 1961. [WHO/UNICEF]

Somalia

78. A mineral and ground-water survey was approved by the Special Fund in January 1962. The purpose of the survey is to undertake exploration of the mineral possibilities of the Bur and other regions of Somalia and concurrently to strengthen

the geologic survey by training Somali nationals in the techniques of mineral and ground-water exploration and evaluation. The project will be undertaken in four years at a cost of \$1,218,800, of which \$928,800 will be contributed by the Special Fund. [SF/UN]

79. A water desalination expert on short mission. [UNRTD]

80. Short-term assistance was given to the Government in drawing up a revised code of water legislation. [FAO]

81. Assistance continued for a survey to evaluate land and water resources, surface and ground water, in the lower basins of the Uebi Scebeli and Giuba rivers for irrigation and pastoral production. [SF/FAO]

82. The sanitary engineer provided from February to May 1963 to examine the immediate and long-term needs in environmental health made a study of the water supply and sewage disposal systems and submitted recommendations on the types of installations likely to be suitable for conditions in the country. [WHO]

South Africa (Republic of)

83. A water desalination expert on short mission. [UNRTD]

South-West Africa

84. A water desalination expert on short mission. [UNRTD]

Spanish Sahara

85. A water desalination expert on short mission. [UNRTD]

Sudan

86. Provision was made in 1963 for the recruitment of a chief engineer to supervise and co-ordinate the various engineering activities of the Regional Offices of the Department of Land and Rural Water Development. [OPEX]

87. A water desalination expert on short mission. [UNRTD]

88. A hydraulic engineer was put at the disposal of the Government to advise on the development of small water storage schemes. [FAO]

89. A drilling specialist advised the Government on organizational and operational problems. [FAO]

90. Studies were continued in the Kordofan Province in the field of soil and water resources (surface and ground water), agriculture, grasslands and various practices of cropping, cultivation and land grazing in relation to all these. [SF/FAO]

91. An allocation of \$1,162,000 was made in May 1962 for a survey of land and water resources in the Jebel Marra area. The project became operational in January 1963. It includes studies in the field of hydrology, hydrogeology and irrigation. [SF/FAO]

Swaziland

92. A water resources development engineer to study the present and future water requirements and availability with particular reference to the international rivers shared by Swaziland. [BTAO/UNRTD]

93. Part of a loan of \$4.2 million will be used for the 10,000-kilowatt Edwaleni hydro-electric plant on the Little Usutu River. [IBRD]

Tanganyika

94. A team of irrigation, drainage and flood control engineers assisted the Government in the assessment of the country's water resources, expansion of irrigation and flood control. [FAO]

95. An expert started an assignment for assistance in the fields of water use and irrigation practices. [FAO]

96. Short-term assistance was given concerning the existing Mbarali irrigation scheme and evaluation of the future development proposals. [FAO]

97. Short-term assistance was given in preparing a plan for agricultural development in the Kilombero Valley. [FAO]

98. Assistance was given to the Government in the preparation of a plan for irrigation development in the Pangani area, for submission to the Special Fund. [FAO]

Togo

99. Under an allocation of \$1,273,500 made in January 1962 for a survey of ground-water and mineral resources in selected areas, assistance was rendered in hydrology, hydrogeology and other fields. [SF/UN]

100. Assistance in the field of hydrology was given to the Government for a soil and water resources survey. [SF/FAO]

101. An irrigation engineer completed his assignment for the implementation of small-scale irrigation, mostly intended for rice cultivation. [FAO]

102. A sanitary engineer was assigned in March 1962 to assist in planning and co-ordinating environmental sanitation work, particularly community water supply, sewerage and sewage disposal projects. [WHO/UNICEF]

Tunisia

103. A water desalination expert on short mission. [UNRTD]

104. An expert to work out arrangements with the Government for a desalination mission. [BTAO/UNRTD]

105. A three-man desalination mission consisting of an economist, a desalination expert and hydraulic engineer was sent in 1963 to study the water resources and the economic possibilities for desalination in southern Tunisia. The report of the mission has been completed and submitted to the Tunisian Government. [BTAO/UNRTD]

106. An expert was assigned as chief of the hydrologic section. The expert is preparing hydrological surveys covering the whole country. [OPEX]

107. An allocation of \$994,000 was made for drawing up a rural plan for central Tunisia. The project became operational in June 1963. Assistance was given in the field of irrigation engineering, drilling, hydrology and hydrogeology. [SF/FAO]

108. Assistance was given in the field of irrigation agronomy. [FAO]

109. A study was made on the potentialities of use of a nuclear reactor for the industrialization of southern Tunisia, taking into account the demand for power over the network as a whole and of the local demand for fresh water. This study is to be published. [IAEA]

110. The Special Fund project on research on the utilization of saline water for irrigation in Tunisia, which became operational in December 1962, will continue for five years. It covers the construction and equipping of a central laboratory at Tunis which will be called the "Research Centre for the Utilization of Saline Water in Irrigation". Trials have been carried out on three experimental plots. The Plan of Operation governing the execution of this project includes the creation of a scientific and technical advisory committee to meet twice a year in order to direct and follow the research and to examine the results. [SF/UNESCO]

111. A fellowship of two months' duration was provided in 1963 for training in hydrometeorology and agrometeorology. [WMO]

Uganda

112. An expert on short-term mission rendered advice on water resources development organization and programming, and was followed up by another expert assisting with ground-water exploration. [BTAO/UNRTD]

113. Short-term assistance was given in the organization of a government service for small-scale water development. [FAO]

114. An irrigation engineer and an agronomist carried out a preliminary survey on the irrigation potential of the Mubuku area. [FAO]

115. Assistance was given in the preparation of a request for an irrigation and pilot demonstration project in Mubuku for submission to the Special Fund. [SF/FAO]

116. One hydrologist was recruited for the investigation of the Koki lakes. [FAO]

117. A sanitary engineer began in August 1963 to plan improvements in environmental sanitation, including water supplies, sewerage and sewage disposal, as part of the development plan for the Kibuga area which is being drawn up with the assistance of the United Nations. [WHO]

118. Short-term assistance was given in advising on the development of water supplies for grazing in the Karamoja district. [FAO]

United Arab Republic

119. Provision was made in October 1963 for a civil engineer to investigate the effects on the Nile River bed of the High Dam operations on the reach between Aswan and Cairo. [BTAO/UNRFD]

120. A water desalination expert on short mission in 1962. [UNRFD]

121. A water desalination expert will be provided early in 1964 to study the economic possibilities of utilizing demineralized water in the eastern desert and Sinai. [BTAO/UNRFD]

122. Investigations and demonstration of tile drainage methods and practices in selected irrigated areas of the Nile delta continued. [SF/FAO]

123. An allocation of \$850,000 was made in May 1963 for pre-investment survey of the North-west and coastal region. The project includes hydrogeology, ground-water development, water conservation and irrigation agronomy. [SF/FAO]

Upper Volta

124. A Mineral and Ground-water Survey was approved by the Special Fund in June 1963. The purpose of the project is to assess the potential of ground-water resources and the best means for their development and to evaluate the economic feasibility of exploiting certain promising mineral occurrences. The project will be carried out in three years at a cost of \$1,627,100, of which \$1,050,100 will be contributed by the Special Fund. [SF/UN]

125. Short-term assistance under Contingency Funds was given in the preparation of a request to the Special Fund for an irrigation and water development project. [FAO]

Zanzibar

126. A sanitary engineering consultant was provided in January and February 1962 to help draw up a sanitation programme for rural areas and submitted recommendations including water supply and sewage disposal. A twelve-month fellowship in sanitary engineering was awarded in 1963. [WHO]

Asia

Regional

127. Assistance continued to be given through Special Fund and technical assistance resources to the Lower Mekong Basin projects. [SF/UN/ECAFE/BTAO]

128. Thirty-one fellowships were awarded in 1962 and 1963 in various fields of water development. [BTAO/UNRITD]

129. A regional expert was assigned to the Cairo Office to advise the countries of the Near East Region on problems of water resources and development. [FAO]

130. Assistance was given in establishing a pilot irrigation scheme under the survey of the Lower Mekong Basin project. [SF/UN/ECAFE/FAO]

131. Two group fellowship study tours on irrigation practices were held in Tashkent (Uzbekistan) attended by candidates from European, African and Asian countries. [FAO]

132. An irrigation agronomist participated in the ECAFE conference on the development of deltaic areas. [ECAFE/FAO/BTAO]

133. The services of two consultant teams have been provided to assist Governments in the Eastern Mediterranean Region in developing the organization and management of community water supply programmes and provide advice on the technical, legal, financial and administrative aspects. [WHO]

Aden

134. Short-term assistance was given in drawing up a well drilling programme and in the organization of a government drilling section. [FAO]

Afghanistan

135. Assistance in water drilling operations was provided in 1962 and 1963. [BTAO/UNRITD]

136. An expert, sent in 1963 in connexion with the World Food Programme, reviewed water and other development projects for further assistance. [UNRITD]

137. A ground-water investigation project was approved by the Special Fund in January 1963. The purpose of the project is to assess the potential of ground-water resources and to demonstrate their rational utilization. The project will be undertaken in five years at a total cost of \$2,099,700, of which \$1,389,700 will be contributed by the Special Fund. [SF/UN]

138. A team of four experts and two associate experts from the Federal Republic of Germany continued to advise on the irrigation projects. The work is of a long-term nature. [FAO]

139. A survey of land and water resources commenced in 1960 was concluded and the final report is under preparation. [SF/FAO]

140. Short-term assistance was given in preparing a request to the Special Fund for water development. [FAO]

141. Assistance was given in starting a canal lining project for irrigation in the Badak area under FFHC funds. [FAO]

142. In the WHO/UNICEF-assisted rural health and environmental sanitation programme carried out since 1956, additional help was given for water supply development and other sanitation activities by the construction of wells and latrines in rural health units. [WHO/UNICEF]

Australia

143. A loan of \$100 million was made to finance part of the Snowy Mountains hydroelectric scheme, a large undertaking for the production of electric power and the provision of irrigation water in southeastern Australia. The IBRD project is known as Murray No. 1 hydroelectric development, which will provide 760,000 kilowatts of generating capacity out of the total of 2 1/2 million expected from the entire scheme. The IBRD project involves the diversion of the Snowy River into the westward flowing Murray River, three large dams, tunnels and pressure pipelines, and the power plant. The water made available for irrigation on the western side of the mountain range will be increased by 440,000 acre-feet a year. [IBRD]

Bahrain

144. A water desalination expert on short mission. [UNRFD]

Burma

145. Following a preliminary short-term mission of three experts, a team of seven experts started a one-year mission in 1963 to undertake studies of the Sittang River Valley, including dam sites, flood control, irrigation, reclamation and hydro-power, and to recommend priorities for development. [BTAO/UNRFD/ECAFE]

146. Provision was made for an expert to assist in the design, construction and operation of a hydraulic laboratory. [BTAO/UNRFD]

147. The Mu River irrigation survey, to determine the technical and economic feasibility of perennial irrigation in the Mu River basin, was approved by the Governing Council of the Special Fund in May 1962. The survey will be carried out in three years at a total cost of \$1,504,400, of which the Special Fund will contribute \$1,054,400. [SF/UN]

148. A mineral and ground-water survey was approved in January 1962 by the Governing Council of the Special Fund. The purpose of the project is to assist the Mineral and Geological Studies Department to survey mineral and ground-water resources in certain selected areas and to train technical personnel in modern methods of exploration. The duration of the survey is four years and it will cost \$3,382,600. The contribution of the Special Fund amounts to \$1,068,000. [SF/UN]

149. A water resources engineer completed his assignment to the Shan States, where he advised on water supply resources, related problems and development. [BTAO/UNRTD]

150. At the completion in January 1963 of WHO and UNICEF assistance to a rural pilot demonstration area for the strengthening of environmental sanitation, a village water supply and latrine construction programme was set up and training of appropriate sanitation personnel undertaken. [WHO/UNICEF]

Cambodia

151. One expert assisted the Government in the establishment of a hydrographic section. [BTAO/UNRTD]

Ceylon

152. Assistance was provided in hydro-power development and hydrography. [BTAO/UNRTD]

153. A mission was sent to the country to assist the Government in the preparation of a request to the Special Fund regarding water resources and irrigation. [FAO]

154. A sanitary engineer has assisted the Government since October 1963 with the development of a community water supply programme. A short-term consultant was assigned to Ceylon on 15 December 1963 to advise on fluoridation of the water supply of Colombo and possibly of other communities. [WHO]

China

155. The Special Fund-assisted hydraulic project, which was started towards the end of 1960, was completed in February 1962. This survey was carried out at a total cost of \$520,100, of which \$342,000 was contributed by the Special Fund. Its purpose was to provide technical assistance and equipment to strengthen the pre-investment planning and survey work on hydraulic development projects. [SF/UN]

156. A comprehensive hydraulic development survey in the Choshui and Wu basins was approved by the Special Fund in January 1963 at a total cost of \$1,594,800, of which \$709,000 was contributed by China. The survey, which will take three years to complete, will assist the Government in the preparation of a comprehensive plan for the optimum conservation, distribution and utilization of all the water resources of the Choshui and Wu basins. [SF/UN]

157. A tidal land development engineer gave advice on levee design and construction of irrigation canals and drainage works. [BTAO/UNRTD]

158. One consultant on hydro-power and flood control projects was provided. [BTAO/UNRTD]

159. Methods of minimizing flood damage by means of dams, dykes or river channel improvements were investigated by an expert in flood control. [BTAO/UNRTD]

160. Assistance was given in basin planning and in dam design and construction. [BTAO/UNRTD]

161. The preparatory work on the Special Fund project for tidal land reclamation was carried out. The project was approved by the Governing Council in January 1964. [SF/FAO]

162. Pumps and piping have been supplied to provide water to 200 health stations. [UNICEF/WHO]

163. With the arrival of a sanitary engineer in January 1963, a new project was begun, to put into effect the recommendations made by a WHO team in 1961 that advised on the administrative, technical and financial aspects of a national community water supply programme. The authorities have decided to implement a substantial five-year plan for a community water supply, at an estimated cost of the equivalent of \$24,555,000, to serve a population of almost 2 million. In November 1963 a short-term consultant arrived in China to assist the Government in the training of waterworks personnel. Two six-month fellowships for operation and maintenance of sanitary drainage and sewerage were awarded in 1963. [WHO]

India

164. Authorization to commence execution of the three-year survey of potential hydro-power sites was given in June 1962 by the Special Fund. The total cost of the project is \$7,361,400, of which \$5 million will be contributed by India. [SF/UN]

165. Under another project, assisted by the Special Fund, for a cavitation research centre, orders were placed for a multi-test water tunnel comprising a major component of the project, and a fellowship was awarded. [SF/UN]

166. A water desalination expert on short mission. [UNRTD]

167. At the request of the Finnish Freedom From Hunger Campaign (FFHC) Committee an FAO expert was sent to the country to study and prepare a water supply project in the Maharashtra State. [FAO]

168. Short-term assistance was given to the Government in preparing a programme for ground-water development. [FAO]

169. A special mission was dispatched to advise on the potential applications of isotope techniques to problems in the development of water resources. [IAEA]

170. A credit of \$15 million was made to improve and extend the Sone irrigation system in west Bihar, making possible the irrigation of about 1 million crop acres annually. A new diversion barrage will be built on the Sone River, a tributary of the Ganges, and the canal system, now comprising 427 miles of canals on one side of the river and 1,235 miles on the other, is being remodelled and extended. [IDA]

171. Part of a loan of \$13 million will be used to complete a project to irrigate about 152,000 acres in the Purna River valley in the State of Maharashtra. The project will, for the first time, introduce irrigated agriculture in a drought-stricken area in the western part of the Indian high plateau. [IBRD]

172. A credit of \$17.5 million was made for the second stage of the Koyna hydroelectric power development which involved the diversion of the waters of the Koyna River from the eastern to the western side of the Continental Divide and power installations. The height of the dam on the Koyna is now being raised, units installed in the Koyna power plant to bring it to its full capacity of 500,000 kilowatts, and a 40,000-kilowatt power station is being built at the foot of the dam. [IDA]

173. The environmental sanitation programme in a rural area of the state of Uttar Pradesh was assisted by a sanitary engineer and a sanitarian in the improvement of water supply and excreta disposal. [WHO/UNICEF]

174. Piped water supplies were provided for several villages in connexion with the assisted public health programme in the state of Madhya Pradesh. [WHO/UNICEF]

175. A Special Fund project is under way with the objectives of preparing engineering and feasibility reports and master plans for water supplies and relevant sewerage and drainage problems of the Greater Calcutta metropolitan area. Consultant assistance was given at the end of 1959 and of 1961, and the programme began in February 1963 with the arrival in Calcutta of the WHO resident engineer. The consultant engineering firm selected for the preparation of the master plan established its office in Calcutta in the same month and is continuing studies of the problems related to water supplies, sewerage and drainage. A short-term consultant was assigned to the project in November 1963 to advise the Government on the planning of emergency systems. A request to the IBRD is in preparation for funds needed for implementation of the first stage of construction. [SF/WHO]

176. An allocation of \$873,500 was made in January 1963 for the establishment of an institute of tropical meteorology and an international meteorological centre. The institute will be concerned with research and investigations on the problems of tropical and subtropical meteorology which will include, among other subjects, hydrometeorological studies for water resources development and studies leading to the establishment of a flood forecasting service in India. The facilities for research and training in the institute will be open to students of other countries in the monsoon area. The execution of the project commenced in October 1963. [SF/WMO]

Indonesia

177. A water desalination expert on short mission. [UNRTD]

177a. Safe water supplies have been installed in 240 institutions under a programme for social services for children. [UNICEF/UN]

178. A pilot project in rural environmental sanitation carried out in West Irian since January 1961 has included a study of relevant technological, social, economic and cultural factors, particularly those affecting village water supply and human excreta disposal. [WHO/UNICEF]

Iran

179. A hydrogeologist was appointed chief of the Ground-water Department, which constitutes part of the Geological Survey Institute project being assisted by the Special Fund for development of mineral and ground-water resources. [SF/UN]
180. Assistance to the technical bureau of the planning organization regarding the preparation and implementation of the third development plan (1962-1967) in the fields of water resources was continued. [BTAO/UNRTD]
181. A water desalination expert on short mission. [UNRTD]
182. A team of six experts continued to assist the Government and has concentrated its efforts on the building up and the improvement of services for hydrography, soils, irrigation and ground-water. Assistance is of a long-term nature. [FAO]
183. Assistance under Contingency Funds was given in re-establishing and developing alternate water supplies as a result of the earthquake in 1962. [FAO]
184. Short-term assistance was given for the preparation of a request to the Special Fund for surface and ground-water investigations for irrigation purposes. [FAO]
185. Restoration of water supplies was part of the emergency aid given following the earthquake in 1962. [UNICEF]

Iraq

186. Assistance was given in the field of water use and land levelling. [FAO]
187. Short-term assistance was given in the field of water use and irrigation practices. [FAO]
188. In October and November 1963 a short-term consultant made a study of problems relating to the treatment of highly mineralized water. [WHO]

Israel

189. A geologist was provided to instruct personnel in modern methods of sub-surface geology and stratigraphy and interpretation particularly for ground-water and petroleum exploration. [BTAO/UNRTD]
190. A water desalination expert on short mission. [UNRTD]
191. Studies in the utilization of land and water resources continued in the water management project in the Nahal Shikma River basin. [SF/FAO]
192. Development work in the project for experimental ground-water collectors was concluded and long-term studies commenced. [SF/FAO]
193. An allocation of \$489,000 was made in May 1962 for the study of the problems connected with ground-water storage. The purpose of the project is to study the problems of mixing and recharge of ground-water. Results obtained to date are promising. [SF/FAO]

Japan

194. Short-term assistance was given in the design of drainage gates in the Nagasaki reclamation project. [FAO]

Jordan

195. A team of experts in the fields of hydrology, hydrogeology, geology and irrigation undertook studies in connexion with the Special Fund-assisted ground-water survey of the Azraq area. This is a three-year project which went into operation towards the end of 1961. Its total cost amounts to \$1,228,800, of which \$811,300 is being contributed by the Special Fund. The purpose of the project is to assess the ground-water potential of aquifers in the area extending westward from Azraq, provide technical training for Jordanian personnel and to study water use and related problems. [SF/UN]

196. A water desalination expert on short mission. [UNRTD]

197. A hydrologist and hydrometrist continued to assist the Government in the organization of a hydrological service. [FAO]

198. Short-term assistance was given in advising on the suitability of water and soils for irrigation under the World Food Programme. [FAO]

199. A credit of \$3.5 million was made to improve and expand the water supply systems serving the Jerusalem area and three other urban centres in western Jordan - the Azraq-Irbid area and the towns of Zarqa and Nablus. The main components in each case involved collection works, transmission mains, pumping facilities, reservoirs and related works, and improvement or expansion of distribution systems. [IDA]

200. A sanitary engineer has assisted since June 1962 in the development of an extensive programme for community water supplies and waste water disposal. A central water authority has been organized and loans approved by the International Development Association for the improvement of the water supply in Amman, Jerusalem, and three other urban centres in western Jordan. [WHO/IDA]

Korea

201. A preliminary reconnaissance survey was completed of the Naktong River and its main tributaries. [BTAO/UNRTD]

202. Field work started in 1962 on the tidal land reclamation survey. The project includes the selection of experimental pilot demonstration areas for development. [SF/FAO]

203. Field operations started in January 1962 on a project planned for a duration of five years for selected watersheds. [SF/FAO]

204. Negotiations are under way for the services of a consultant engineering firm which will assist in the improvement of water supplies for the city of Seoul. [WHO]

Kuwait

205. Provision was made for assistance in the development of underground water resources. [BTAO/UNRTD]

206. Assistance provided by a water drainage and sewerage engineer was continued. [OPEX]

207. A water desalination expert on short mission. [UNRTD]

Laos

208. A hydraulic engineer and a surveyor continued their assistance in the field of topographical survey and irrigation methods. [FAO]

209. Pumping equipment for water supplies was provided for two rural development projects. [UNICEF/FAO/WHO]

Lebanon

210. Experts were provided to carry out a ground-water survey project, which was approved in May 1962 and will take five years to complete. The total cost of the survey is \$1,966,600, of which \$816,600 will be contributed by the Special Fund. [SF/UN]

211. An allocation of \$486,000 was made in 1963 for the soil survey and related irrigation schemes project. The project includes study of soils, topography and improved irrigation methods and practices. [SF/FAO]

Malaysia

212. The irrigation specialist and the expert in irrigation and water use concluded their study on soil/water relationship with reference to wet paddy. [FAO]

213. The WHO Regional Sanitary Engineer visited Sabah in October 1963 preparatory to the development of a community water supply programme. A short-term consultant for water treatment is being recruited. A four-month fellowship in rural environmental sanitation was awarded in 1963. [WHO]

214. Under the project approved earlier for assistance for surveys of the Labuk Valley in Sabah (North Borneo), experts were provided in the fields of hydrology, agronomy and geology. [SF/UN]

215. Part of a loan of \$51.9 million was made for the second stage of the Cameron Highlands scheme for developing the hydroelectric power potential of groups of streams in the Cameron Highlands Plateau, about 100 miles north of Kuala Lumpur. The Batang Padang project, now being built, involves the impounding of waters of two rivers and the tailrace waters of the first stage to create a reservoir for two power plants - one with a capacity of 100,000 kilowatts and the other with a capacity of 2,800 kilowatts. [IBRD]

216. Recruitment is in progress of short-term consultants to assist in water treatment problems and in training of community water supply personnel. [WHO]

Nepal

217. Field operations started in early 1962 on the project, earlier approved by the Special Fund, for hydroelectric development of the Karnali River. It will be carried out over three years, at a total cost of \$1,199,400, including \$974,400 contributed by the Special Fund. Following an interim report, work was concentrated on the most favourable sites for hydro-power development for the preparation of a comprehensive feasibility report. [SF/UN]

218. A team of four experts continued to assist the Government in the irrigation and other water development works in the valleys around Kathmandu. This assignment is of a long-term nature and is continuing. [FAO]

219. During assistance, completed in December 1961, in connexion with organizing the work of the Central Health Directorate and developing health plans to meet the country's needs, the piped water supply for the Kathmandu valley was increased, safe water supplies were provided for several towns and villages, and hand-operated tube wells were installed in more than 400 villages. Recruitment of a sanitary engineer, who will assist the Government in the development of a community water supply programme, is in progress. [WHO]

Pakistan

220. An expert to assist in the preparation and evaluation of water development projects including multi-purpose projects. [BTAO/UNRITD]

221. The construction of the Gudu Barrage, which was placed under the executive control of a team of experts in 1959, was successfully completed in December 1962. The Gudu Barrage will increase the area under cultivation from 1,467 to 4,161 square miles. [BTAO/UNRITD]

222. A water desalination expert on short mission. [UNRITD]

223. The hydrological survey in East Pakistan started in May 1962. The main purposes of the project are to build up a national hydrological service for East Pakistan. [SF/FAO]

224. An irrigation agronomist continued to participate in the team for the Ganges-Kobadak project. [FAO]

225. Two credits, totalling \$50 million, were provided for water supply and sewerage projects in the cities of Dacca and Chittagong in East Pakistan; \$26 million for the Dacca project and \$24 million for Chittagong. For each city the water supply projects include the development of a new water source from a nearby river, intake works, water treatment plants, pumping stations to deliver water through new transmission mains, and storage tanks. The sewerage schemes for both cities will be the first phase of long-range programmes and include a system of major sewers, several pumping stations, simple treatment facilities and outfall sewers. [IDA]

226. A credit of \$9 million was made for a flood protection, drainage and irrigation project near Chandpur in East Pakistan. About 108 miles of embankment will be built to protect the land from flood and tidal waters from adjoining

rivers. Dual-purpose pumping stations, irrigation canals, drainage channels and related works will be built to drain the area and irrigate 109,000 acres. [IDA]

227. A credit of \$5 million was made for a project to protect about 400,000 acres of cultivated land in East Pakistan from flooding by the Teesta and Brahmaputra rivers. [IDA]

228. A credit of \$18 million was made for the Khairpur ground-water and salinity control project to restore and protect the productivity of more than 300,000 acres of farmland in the lower Indus Valley. [IDA]

229. As part of a rural health and sanitation programme, materials and equipment have been provided for eighty-six village water projects and for a central water testing laboratory. Consultant advisers have also been provided. [UNICEF/WHO]

230. The WHO sanitary engineer in West Pakistan advised on the design of rural water supplies and made a study of urban water supplies. Considerable progress was made subsequently with a programme of providing water supplies and sewerage systems in urban and rural areas. An independent public health engineering department was set up in 1961. Because of the great shortage of technicians competent to run modern water supply systems, an important part of WHO activities has related to training, including the award of four fellowships in sanitary engineering. Plans have been made for the development of a large-scale rural water supply project in Pakistan. [WHO]

Philippines

231. A loan of \$3.7 million was made for a 50,000-kilowatt expansion of the Maria Cristina Falls hydroelectric power plant to increase power supplies on the island of Mindanao. The power station is the first of a series of installations which will be developed to use the excellent hydroelectric power potential of the Agus River. [IBRD]

232. The IBRD contributed \$200,000 to help pay for a study directed toward the improvement and expansion of the water supply system in the Manila metropolitan area being carried out by Canadian and United States consultants. [IBRD]

233. A short-term consultant spent most of August and September 1963 assisting the Government in matters of administration regarding the Manila water supply. [WHO]

Qatar

234. A water desalination expert on short mission. [UNRTD]

Sarawak

235. The provision of safe water supplies in eighteen districts is part of a basic sanitation programme. [UNICEF/WHO]

Saudi Arabia

236. Provision was made for a desalination expert to study the possibilities of desalination in the eastern province. [BTAO/UNRTD]

237. A water desalination expert on short mission. [UNRFD]
238. Short-term assistance was given to advise the Government on prospects for hydro-agricultural development. [FAO]
239. A water development expert was appointed under Funds-in-Trust to advise the Government on general development programmes. [FAO]
240. Short-term assistance was given to the Government for drawing up proposals for a plan for the implementation of long-term development projects under Funds-in-Trust. [FAO]
241. A water resources survey in the Wadi Jizan, started in 1962, continued and will conclude early in 1964. [SF/FAO]
242. Recruitment of a sanitary engineer under Funds-in-Trust is under way to assist in planning and organizing a community water supply programme. [WHO]

Syria

243. Assistance was given in the preparation of a hydrological yearbook and organization of the hydrological service. [FAO]
244. An expert was assigned for twelve months to assist in the design and execution of irrigation projects. [FAO]
245. Field work on the survey of ground-water resources in the Jezireh area was concluded in December 1963 and the report is under preparation. [SF/FAO]
246. An allocation of \$633,000 was made for planning the integrated agricultural development of the Ghab Region. This includes problems of hydrology, irrigation design, irrigation practices and water use, drainage and salinity and irrigation agronomy. [SF/FAO]
247. Short-term assistance was given to the Government in preparing a request to the Special Fund for a new ground-water project in four basins. [FAO]

Thailand

248. Provision was made for assistance in dam design. [ETAO/UNRFD]
249. Two experts are assisting the Government in the field of irrigation development. [FAO]
250. Two loans totalling \$9 million were made for projects to increase agricultural production through irrigation. A loan of \$5.6 million was for a further stage in the development of irrigation of nearly two million acres of the Chao Phya area in the Central Plain, Thailand's chief rice producing region; and a loan of \$3.4 million was for a project to irrigate about 130,000 acres of the Petchburi Plain, southwest of Bangkok on the Thai Peninsular. [IBRD]

Tonga

251. The programme to provide community water systems to all schools and villages throughout Tonga has been started on the major island of Tongatapu. Storage, pumping and distribution equipment has been supplied and an engineering adviser provided. [UNICEF/WHO]

252. With the assistance of the WHO Sanitary Engineer and the provision of equipment and supplies by UNICEF, the installation of piped water supplies was completed in several villages. Work is progressing on water supply schemes to serve twenty schools and another twenty-seven villages. These installations have aroused interest in other Pacific island communities, including Western Samoa, visited by the WHO engineer in September 1963 at the Government's request to discuss sanitation problems in that country. [WHO/UNICEF]

Viet-Nam

253. Advice on small-scale irrigation projects is continuing. [FAO]

Europe

Regional

254. Assistance was given to the working group on water resources and irrigation of the European Commission on Agriculture. [FAO]

Albania

255. Some hydrometeorological equipment was supplied in 1962, and a three-months' fellowship was provided in 1963. [WMO]

Cyprus

256. In May 1962 a five-year survey of ground-water and mineral resources was approved by the Special Fund. The total cost of the survey amounts to \$2,935,000, of which \$1,340,000 was contributed by the Special Fund. [SF/UN]

257. Assistance was provided in the design and construction of dams. [BTAO/UNRFD]

258. An expert was provided to administer and manage the Water Development Department. [OPEX]

259. A water desalination expert on short-mission. [UNRFD]

260. A senior irrigation engineer was appointed to advise the Government on the development of irrigation schemes. He was assisted by an associate expert from the Netherlands. [FAO]

261. Studies in the field of water use were carried out and a plan drawn up and approved by the Government for a pilot project in this field. [FAO]

262. Advice on a new water legislation code was given to the Government by the services of two consultants in 1962. [FAO]

Greece

263. A water desalination expert on short mission. [UNRFD]

264. Assistance from a team of irrigation experts continued in the Acheloes and Parakalamos areas till the end of 1962. [FAO]

265. Assistance was given to the Government in the preparation of an irrigation development scheme in Crete under Freedom From Hunger Campaign (FFHC) funds. [FAO]

266. The ground-water investigation project concluded in March 1963. A panel of experts was convened to review the results of the project and the problems related to the hydrogeology of karstic limestone regions in the Mediterranean area. [SF/FAO]

267. Assistance continued under the economic survey in the western Peloponnesus project, in the fields of hydrogeology, water use and irrigation. [SF/FAO]

268. A consultant paid a short visit to the country to advise the Government on water use and irrigation practices. [FAO]

269. As part of the ground-water project, radioisotopes were used for studying interconnexions of sinkholes and springs. [SF/FAO/IAEA]

270. A team of hydrogeologists will start early in 1964 on a programme of assistance to the Government in the organization of a hydrogeology department and in planning ground-water studies and geological problems related to civil engineering. [FAO]

271. Greece was visited by two WHO consultants in October and November 1960 and by another consultant late in 1962, to advise the Government on community water supplies. Following the preparation of a preliminary design, including cost estimates for capital investment, and a feasibility report on a proposed regional scheme for a group of villages and towns in an area north of Larissa where general socio-economic development is taking place, active operations were begun in March 1963. [WHO]

272. An expert completed a three-weeks' preliminary mission during which he advised the Government as to the hydrometeorological equipment to be ordered. The expert will assist in the installation of the equipment during a second mission later. A six-months' fellowship was also provided. [WMO]

Hungary

273. A twelve-months' fellowship for training in hydrometeorology was provided. [WMO]

Iceland

274. In June 1963 the Special Fund approved a two-year survey of hydroelectric power development in the Hvita and Thjorsa River basins. An allocation of \$214,900 was made by the Special Fund towards the total cost of the survey which amounts to \$702,900. [SF/UN]

275. A loan of \$2 million was made for the extension of Iceland's unique system of supplying hot water for domestic and commercial heating in Reykjavik, an area of volcanic activity. Hot water is pumped from natural hot springs and artesian wells and distributed to houses and buildings for space heating and hot tap-water. The distribution system will be enlarged and more wells drilled to develop additional hot water sources. [IBRD]

Italy

276. A six-week fellowship in sewage and waste treatment was awarded in 1962. [WHO]

Luxembourg

277. A consultant was provided for approximately two months at the end of 1962 to study the problem of disposal of wastes, with a view to preventing pollution of the country's water resources. [WHO]

Malta

278. A water desalination expert on short mission. [UNRTD]

279. Investigations on salt-water/fresh-water relationship in the development of ground-water continued under Funds-in-Trust. [FAO]

280. Assistance was given to the Government in the survey of water resources and development, and on the use of water for agriculture. [FAO]

281. A loan of \$7.5 million was made for a combined thermal electric power and sea water distillation project. The latter will be a multi-stage flash distiller with a capacity of 1 million imperial gallons a day. [IBRD]

Norway

282. A loan of \$25 million was made for the construction of two hydroelectric power plants with a combined capacity of 340,000 kilowatts. Water for the Rana plant in northern Norway will come from the concentration of several streams into a system of diversion tunnels using natural lakes as reservoirs. Water for the other plant in central Norway will come from the exploitation of river systems in the Trollheim Mountains. [IBRD]

Poland

283. A three-month fellowship in water and sewage disposal was awarded in 1962. [WHO]

Portugal

284. A loan of \$7.5 million was made for the 210,000 kilowatt plant at Bemposta which is the last of three hydroelectric developments on Portugal's stretch of the international Douro River. [IBRD]

Spain

285. A water desalination expert on short mission in the Canary Islands. [UNRTD]

286. A water desalination expert on short mission. [UNRTD]

287. Training in the field of water supplies and sewage disposal was included in the courses on sanitation given at the Engineering School of the University of Madrid. [WHO]

Sweden

288. A one-month fellowship in water supply and sewage disposal was awarded in 1963. [WHO]

Turkey

289. A water desalination expert on short mission. [UNRTD]
290. Assistance by a team of experts from the International Institute for Land Reclamation and Drainage continued in the field of drainage. [FAO]
291. An allocation of \$570,800 was made in June 1963 for the second phase of the pre-investment survey in the Antalya Region. The project is assisted in the field of water resources by a hydrologist and a senior water development specialist, an irrigation engineer and a drainage expert. In addition short-term visits by engineering geologists (consultants) were made. [SF/FAO]
292. Two fellowships in the field of the development of irrigation were awarded to Turkish nationals for study in Spain. Five fellowships in the field of drainage studies were awarded for courses at the International Institute for Land Reclamation and Drainage, Netherlands. [FAO]
293. Assistance was given in the field of water use and irrigation efficiency. [FAO]
294. As part of the Antalya project, radio-isotopes were used for the study of interconnexions of sinkholes and springs. [FAO/IAEA]
295. A credit of \$20 million was made for the first stage of a programme to develop irrigation farming on the Adana Plain. In this stage, works will be built or completed for the drainage and irrigation of 130,000 acres. [IDA]
296. A credit of \$1.7 million was made for the installation of an additional 18,000-kilowatt unit in a 36,000-kilowatt hydroelectric plant on the Seyhan River which supplies power in the Adana Plain. The credit will also finance engineering studies for two additional power plants in the area, one of which will be a hydroelectric plant on the Kadincik River near Tarsus. [IDA]
297. A community water supply project began with the arrival of a WHO sanitary engineer and a sanitarian in 1963. A short-term consultant was also assigned to Turkey to assist in the preparation of engineering and feasibility reports for water supplies. [WHO]
298. An expert completed a three-month mission. The mission was for the purpose of enlarging the scope of previous assignments. The expert demonstrated and explained methods of hydrometeorological analysis of the flow from a catchment whose surface water regime is affected by a large fresh water lake. He also demonstrated the method of visual observation of the elevation of the snowline for the purpose of making snow melt forecasts. [WMO]

United Kingdom (Channel Islands)

299. A water desalination expert on short mission. [UNRTD]

Yugoslavia

300. A fellowship was awarded in the field of underground water resources. [BTAO/UNRTD]

301. The pilot land reclamation project in the lower Neretva continued with assistance in the fields of hydraulic engineering and hydrogeology. [SF/FAO]

302. A special mission was despatched to the country to advise on the potential applications of isotope techniques to problems in the development of water resources and was followed up by experimental field work. [IAEA]

303. A loan of \$30 million was made for a continuation of a national power expansion programme which includes the 240,000-kilowatt Bajina Basta hydroelectric plant on the Drina River. This has been given high priority because of the importance of developing the power potential of the Drina River basin which has an unusually heavy rainfall and offers the possibility of creating large volumes of storage water. [IBRD]

Latin America

Regional

304. Eleven fellowships in various water development fields were awarded in 1962 and 1963. [BTAO/UNRFD]
305. A contribution of \$1,404,800 was approved to assist the Governments of Brazil and Uruguay in studies for the development of the Mirim Lagoon basin. Work will start early in 1964. [SF/FAO]
306. Three sanitary engineers visited the national agencies responsible for water services in nineteen countries of the Americas, to gather information on the standards in force for the design of water systems and other technical aspects. [PAHO/WHO]
307. A consultant hydrologist made a preliminary study of the area's resources in the six Central American countries to make the best possible use of ground water. [PAHO/WHO]
308. Fifteen short-term consultants were provided to eleven countries to give advice on problems relating to the organization and administration of water supply systems and the establishment of water rates. [PAHO/WHO]
309. In at least sixteen countries, advice on rural sanitation problems given to Government and training projects of sanitary and auxiliary personnel included specifically rural water supplies. [PAHO/WHO]
310. A regional seminar for sanitary superintendent and inspector personnel, of interest to the countries and territories of the Caribbean area, was held in Barbados. [PAHO/WHO/UNICEF]
311. Assistance was provided in preparing requests by the riparian countries to be submitted to the Special Fund for the survey of water resources in the La Plata River basin. This action is continuing in 1964. [ECLA]
312. Four short-term consultants and headquarters staff held the second course on water supply design in Mexico: thirty-five students from Latin American countries attended. [PAHO/WHO]
313. A short-term consultant on water quality standards visited various countries to observe laboratories and methods of water analysis. [PAHO/WHO]

Argentina

314. A water desalination expert on short mission. [UNRFD]
315. A water desalination expert was provided in 1962 to undertake a comparative cost analysis of desalination and conventional water supply sources in certain economically important areas. [BTAO/UNRFD]

316. Assistance in the field of water desalination was provided in 1963. The expert completed his assignment in five months and submitted a report in November 1963. [BTAO/ECLA]
317. An expert in civil engineering gave advice on the navigability of the Argentine rivers, particularly flow, depth, tides, siltation, locks and dams. [BTAO/UNRTD]
318. Advice was given in the planning, construction and installation of a hydraulic laboratory and on the studies and tests of river and coast models. [BTAO/UNRTD]
319. A hydrologist was provided to formulate a programme for the organization and operation of a ground-water institute and to assist in the preparation of a request to the Special Fund. [BTAO/UNRTD]
320. In June 1963 a project for ground-water research in the north-west was approved by the Special Fund. The purpose of the project is to investigate and assess ground-water resources in arid and semi-arid zones of Argentina with a view to opening new areas to agriculture. This project will take four years to complete and will cost \$1,324,000, of which \$674,000 will be contributed by the Special Fund. [SF/UN]
321. A joint group of water resources experts completed studies and investigations on water resources in the country. The final report of the mission is now under preparation. [ECLA/BTAO/WMO]
322. Work on the establishment of an institute for watershed management and forest engineering continued. [SF/FAO]
323. An allocation of \$760,000 was made in July 1963 for the study of land reclamation in the Viedma Valley. [SF/FAO]
324. A special mission was dispatched to the country to advise on the potential applications of isotope techniques to problems in the development of water resources. [IAEA]
325. A seminar on water supply systems design was held in Buenos Aires. [PAHO/WHO]
326. Short-term consultant services were provided to accelerate well-drilling operation of projects. [PAHO/WHO]
327. Reorganization and decentralization of the health service administration of San Juan Province included installation of wells and pumping equipment in seven health districts. [UNICEF/WHO]
328. A sanitary engineer was posted to assist in the extension of the water supply of the city of Resistencia. [WHO]
329. Two consulting engineers were provided to assist in studies and preparation of plans for projects in El Cuaco and San Juan provinces. [PAHO/WHO]

Bahamas (United Kingdom)

330. A water desalination expert on short mission. [UNRITD]

Bermuda (United Kingdom)

331. A water desalination expert on short mission. [UNRITD]

Bolivia

332. A water resources expert in the field of irrigation assisted in the Special Fund project at the University of San Simón in Cochabamba. [SF/FAO]

333. Advisory services were given on the drafting of legislation for the establishment of water and sewerage boards. [PAHO/WHO]

334. The health service programme for the Andean Indian population included the sinking of more than 200 wells, and provision of pumping equipment and distribution piping. [UNICEF/WHO]

335. A sanitary engineer assisted in a need survey of drinking water supplies. [PAHO/WHO/UNICEF]

336. Advisory services were given on the expansion of community water supplies to the three most important cities and to mining areas. [PAHO/WHO]

Brazil

337. An expert in hydrology was assigned to determine the hydrologic potential of the main fluvial basins. [BTAO/UNRITD]

338. A water desalination expert on short mission. [UNRITD]

339. Surveys and investigations for irrigation and river basin planning in the middle reaches of the San Francisco Valley will be completed on 31 December 1964. [SF/FAO]

340. In November 1962 the IBRD agreed to act as executing agency for the preparation of a long-range plan for the development of the six main river systems of the State of Minas Gerais for the generation of electric power, flood control and irrigation. The Special Fund had allocated \$735,000 toward the cost of the project which will be carried out by Centrais Eletricas de Minas Gerais (CEMIG) with the assistance of Canambra, a group of foreign consultants. The project is scheduled for completion by the end of 1965. [SF/IBRD]

341. In May 1963 the IBRD agreed to act as executing agency for a survey of the hydroelectric resources and power market of Brazil's South Central Region and for the development of a 15-year construction programme for power generation and transmission in the region. The Special Fund has allocated \$1,800,000 toward the cost of the project. The survey will supplement that being undertaken for the State of Minas Gerais, and will cover the main basins of the Parana, Paranaíba, Paraíba, Itabapoane and Ribeira Rivers in the States of Minas Gerais, São Paulo, Rio de Janeiro, Espírito Santo, Parana and Mato Grosso. The study should be completed in about three years. [SF/IBRD]

342. Assistance was provided to the Government in the preparation of a Special Fund request for the establishment in the Guanabara State, Rio de Janeiro, of an institute for sanitary engineering. [PAHO/WHO]

343. As part of a project to provide basic sanitation for rural inhabitants of eight States the provision of public water supplies to more than 300 communities was undertaken, serving a population of about 1.2 million. [UNICEF/WHO]

344. A short-term consultant and headquarters staff gave assistance in the preparation of water rate schedules for Salvador and the States of Bahia and Guanabara. [PAHO/WHO]

345. A short-term consultant gave advice on floridation of water supplies. [WHO]

British Guiana

346. Provision was made for a water economist to undertake a preliminary survey of the country's water resources and suggest priorities in their development. [BTAO/UNRWD]

347. Assistance was given in the preparation of a plan for an integrated development of water resources. [BTAO/UNRWD]

348. Following a preliminary investigation of problems of power and water resources development, a study was implemented on the hydrometeorological and hydrological aspects and for the establishment of corresponding hydrometric stations. The relevant report is under preparation. [ECLA/BTAO/WHO]

349. Survey and planning of the Canje Reservoir Scheme, to provide flood control, irrigation and drainage, continued in 1962 and 1963. The project started in August 1962. [SF/FAO]

350. Advisory services were given on the drafting of legislation for the establishment of water and sewerage boards. [PAHO/WHO]

351. Advisory services were given on the improvement of rural water supplies in the heavily populated coastal areas. [PAHO/WHO/UNICEF]

British Honduras

352. Consultant services were provided on advisory techniques for the preparation of new projects for water supplies or for the expansion of existing ones and in the training of professional and auxiliary personnel. [PAHO/WHO]

353. Water supplies from dug and drilled wells, including pumps and distribution, are being provided to a rural population of about 8,000 as part of the integrated health services in the Orange Walk district. [UNICEF/WHO]

354. A sanitary engineer assisted the Government in the reconstruction of water supplies damaged or destroyed by hurricane Hattie in 1961. [UNICEF/WHO]

British West Indies

355. Consultant services were provided on advisory techniques for the preparation of new projects for water supplies or for the expansion of existing ones and in the training of professional and auxiliary personnel. [PAHO/WHO]

356. Detailed plans for supplying water were completed, and the possibilities of ground-water development studied. An application for financial assistance to AID and UNICEF was prepared. [PAHO/WHO]

Barbados

357. A hydrogeologist assisted in the appraisal of ground-water resources and the organization of drilling operations. [BTAO/UNRFD]

358. A water desalination expert on short mission. [UNRFD]

359. Short-term consultant services on sewerage and sewage treatment were provided. [PAHO/WHO]

360. The possibilities of ground-water development were studied, and advice given on waterworks management and quality control. [PAHO/WHO]

Dominica

361. Nine new water systems completed the provision of safe water to all villages on the island. [UNICEF/WHO]

362. Assistance is being provided in the study of the island's water resources. [PAHO/WHO]

Grenada and St. Vincent

363. Advisory staff and materials have been supplied as part of a programme to improve water supplies on the two islands. [UNICEF/WHO]

Montserrat

364. The Government have acquired full rights to all springs on the island, and twelve of these have been protected and the supply systems from them improved and extended. [UNICEF/WHO]

365. The possibilities of ground-water development were studied. [PAHO/WHO]

Chile

366. A water desalination expert on short mission. [UNRFD]

367. Assistance in irrigation continued. [FAO]

368. A special mission was despatched to the country to advise on the potential applications of isotope techniques to problems in the development of water resources. [IAEA]

369. As part of a vocational training scheme for young people in the urban fringe of Santiago, self-help activities, including the provision of water supplies, are included. [UNICEF/ILO]

370. In the provinces of Atacama and Coquimbo, an environmental sanitation project includes the provision of wells, drilling equipment and pumping machinery for hospital-health centres and for the rural population. [UNICEF/WHO]

371. In the rural areas of Ovalle and Copiapó, water supplies have been extended by the drilling of wells and the provision of pumps. [UNICEF/WHO]

372. In the southern provinces, damaged by earthquakes in 1960, reconstruction measures have included water supplies. [UNICEF/WHO]

373. A short-term consultant gave advisory services in the planning of extensions to Santiago water supply and also in the planning of projects for water supplies for Concepción and Taleahuano. [PAHO/WHO]

Colombia

374. Assistance in the field of water development was provided under the soil survey project in the Llanos Orientales. [SF/FAO]

375. A loan of \$8.8 million was made for the further expansion of electric power in the Cauca Valley. Part of the loan will be used for the installation of two 30,000-kilowatt units at the Calima I hydroelectric plant to bring it to its full capacity of 120,000 kilowatts. [IBRD]

376. A loan of \$50 million was made for a group of projects to increase the supply of electric power to Bogota and the surrounding area, mainly through the further development of the hydroelectric potential of the Bogota River. Included are the new Colegio hydroelectric plant with an initial capacity of 150,000 kilowatts; raising the height of the Guatavita Dam to 162 feet, thereby increasing the capacity of the storage reservoir; and additional pumping facilities at the Muna Reservoir which is used for the regulation of water for the power plants. [IBRD]

377. Lectures on sanitary engineering and water supply systems management were given by two consultants in the National University of Bogota. [PAHO/WHO]

378. Consultant services were provided on advisory techniques for the preparation of new projects for water supplies or for the expansion of existing ones and in the training of professional and auxiliary personnel. [PAHO/WHO]

379. Short-term consultant services were provided to accelerate well-drilling operation of projects. [PAHO/WHO]

380. The improvement of water supplies in six departments includes construction of some 450 wells as well as surface water schemes, reservoirs and distribution schemes. [UNICEF/WHO]

381. Two courses for training of water works operators were held, and a programme of rural water supplies drawn up. [PAHO/WHO]

382. Two full time engineers and short-term consultants advised on improvements to the municipality of Cúcuta's water supplies, to the town of Tunja and ten other important cities. Five fellowships were awarded for study of water supplies in various Latin American countries and in the United States of America. [PAHO/WHO]

383. A short-term consultant gave advice on the fluoridation of water supplies. [WHO]

Costa Rica

384. An amount of \$9.9 million out of a \$22 million loan made in Costa Rica was for the construction of a 56,000-kilowatt hydroelectric plant near Cachi on the Reventazon River; power output will be fed into the country's integrated network. [IBRD]

385. Assistance was provided to the Government for the preparation of a Special Fund request in the sanitary engineering field and for the establishment of a national ground-water resources institute. [PAHO/WHO]

386. A study was carried out on the effects of dumping untreated wastes from a new chemical fertilizer plant into the ocean. [PAHO/WHO]

387. Advisory services were given on the drafting of legislation for the establishment of water and sewerage boards. [PAHO/WHO]

388. Short-term consultant services on sewerage and water supplies were provided. [PAHO/WHO]

Dominican Republic

389. Advisory services were given on the drafting of legislation for the establishment of water and sewerage boards and in the preparation of an emergency plan for potable water supply. [PAHO/WHO]

390. Consultant services were provided on advisory techniques for the preparation of new projects for water supplies or for the expansion of existing ones and in the training of professional and auxiliary personnel. [PAHO/WHO]

391. In the San Cristobal demonstration area and in the health zone of Pedro Macoris drilling equipment has been provided and a programme of well sinking, installation of pumps and piping is under way which will benefit an estimated 100,000 people. [UNICEF/WHO]

Ecuador

392. A two-year survey of hydrological resources of Manabi Province was approved by the Special Fund in May 1962. The total cost of the survey amounts to \$740,600, of which \$487,600 was contributed by the Special Fund. The purpose

of the project is to make a survey of the water and power resources of Manabi Province. [SF/UN]

393. A water desalination expert on short mission. [UNRTD]

394. Two water resources experts in ground-water hydrology and irrigation continued to assist in the pre-colonization survey in the Andean Highlands. [SF/FAO]

395. Well sinking and other environmental health measures from part of the Andean Programme covering 100 rural communities in six provinces. [UNICEF/FAO/ILO/WHO]

396. One short-term consultant on design, a consultant on water treatment laboratories and a financial consultant to prepare a feasibility study of the water supply plan for Quito were provided. [PAHO/WHO]

El Salvador

397. Assistance in the fields of hydrogeology, water development and drilling techniques in the ground-water survey of the Lower Rio Grande de San Miguel will conclude in January 1964. [SF/FAO]

398. A loan of \$6 million for the further expansion of electric power in El Salvador included funds for the installation of an 18,000-kilowatt unit at the Gayabo hydroelectric plant on the Lampa River bringing total capacity to 78,000 kilowatts and completing power development at that site. [IBRD]

399. In Acajutla a study was carried out on the effects of dumping untreated wastes from factories being established in the new port. [PAHO/WHO]

400. Advisory services were given on the drafting of legislation for the establishment of water and sewerage boards. [PAHO/WHO]

401. Short-term consultant services on sewerage and water supplies were provided. [PAHO/WHO]

402. As part of a ten-year programme to supply potable water for 50 per cent of the rural communities of the country, drilling equipment, wells, storage tanks and piping have been provided in thirty communities with a population of more than 24,000. [UNICEF/WHO]

403. Two short-term consultants in hydrology and hydrogeology, two on organization and water rates, and one on pollution control were provided, and four fellowships awarded for sanitary engineers to study in Puerto Rico and Colombia were granted. [PAHO/WHO]

Guatemala

404. Advisory services were provided to the municipality of Guatemala City in the study of water supply expansion, including the provision of a short-term

consultant, and assistance was also given in connexion with a loan application to provide water to several cities of the interior. [PAHO/WHO]

405. A seminar was organized for water supply schemes operation and maintenance personnel. [PAHO/WHO]

406. The services of an expert were provided in order to advise the Government on the establishment of a unified network of meteorological and hydrological stations in Guatemala, and lectures were given to members of the staff of the national observatory. [WMO]

Haiti

407. The project on the land and water survey in the Gonaives Plain and the North-West Department became operational in November 1963. [SF/FAO]

408. A water engineer was provided to assist in the collection of basic information for planning expansion of the water supply to Port-au-Prince, also in formulating a loan request from external financial institutions. [PAHO/WHO]

Honduras

409. Engineering advisory services were provided for programming community supplies for eighty rural areas. [PAHO/WHO/UNICEF]

410. Assistance was given by a short-term consultant and headquarters staff on the expansion of water supply services in Puerto Cortés, including preparation of financial arrangements and the awarding of a contract to a consulting firm. [WHO]

Jamaica

411. Technical advice was given on the Harker's Hall multi-purpose water development project. [BTAO/UNRTP]

412. Assistance provided on studies and designs for programme of rural water supplies, consisting of seventy-six construction and improvement projects. [UNICEF/PAHO/WHO]

413. Assistance was given to the Government in the preparation of a request to the Special Fund for ground-water studies in the island. [FAO]

Mexico

414. A water desalination expert on short mission. [UNRTP]

415. A loan of \$130 million was made for the 1962-65 expansion programme of the Federal Electricity Commission which will add 2,550,000 kilowatts of generating capacity to the systems serving the most important centres of industry and population. Included in this programme are ten hydroelectric plants with a total capacity of 1,130,000 kilowatts. [IBRD]

416. A loan of \$12.5 million was made for the completion and rehabilitation of three irrigation systems which will improve irrigation on 820,000 acres of farmland in northeast and north central Mexico. The main works include the digging of about 640 miles of new drains and the renovation of 430 miles of existing drains, the improvement of 480 miles of canals and of control structures and other facilities necessary for better water distribution. [IBRD]

417. Consultant services were provided on advisory techniques for the preparation of new projects for water supplies or for the expansion of existing ones and in the training of professional and auxiliary personnel. [PAHO/WHO]

418. Drilling equipment, pumping plant and piping have been provided, and wells and distribution systems constructed, in fourteen States of the Republic, and this programme is being expanded to cover 120 rural communities. [UNICEF/WHO]

419. Advisory services, consisting of two short-term consultants and one staff engineer, were provided to the Government in the preparation of a national programme of construction and extension of water supplies. Publications were prepared and two fellowships awarded, and assistance given to the city of Monterrey in the preparation of plans for new water supply. [PAHO/WHO]

Netherland Antilles

420. A water desalination expert on short mission. [UNRFD]

421. Provision was made to send a two-man desalination mission in January 1964 to survey the power demand and supply situation and make proposals for an efficient utilization of power for desalination and to review the technical and economic efficiency of desalination plants with particular regard to the operations of combined water-power plants. [BTAO/UNRFD]

Nicaragua

422. Provision was made to appoint a director, Agricultural Operations Department; Rivas Irrigation Project. [OPEX]

423. An irrigation adviser continued to assist the Government in 1962 and 1963 on irrigation projects. In December 1963, a request was issued under OPEX to continue this work. [FAO]

424. A \$2.6 million loan was made for the Rivas irrigation scheme, the first large-scale irrigation project in Nicaragua, under which water will be brought to 22,000 acres of land. [IBRD]

425. A credit of \$3 million was made for the expansion and improvement of the water supply system in Managua which involves new pumping facilities, improved distribution systems and treatment works, and a study of additional water sources. [IDA]

426. Consultants were provided on advisory techniques for the preparation of new projects for water supplies or for the expansion of existing ones and in the training of professional and auxiliary personnel. In particular a programme of

research on ground water was prepared, which will be the subject of Special Fund application. [PAHO/WHO]

427. Advisory services were given on the drafting of legislation for the establishment of water and sewerage boards. [PAHO/WHO]

Panama

428. An expert was provided to assist in the administration of the Institute of Hydraulic Resources and Electrification. [BTAO/UNRFD]

429. A project manager was assigned for the survey of the Chiriqui and Chico River basins undertaken with Special Fund assistance. Authorization to commence the execution of this two-year project was given in November 1963. The main purpose of the survey is to determine and plan the utilization of the resource potential of the Chiriqui and Chico basins. The Special Fund will contribute \$418,600, out of a total of \$509,600 allocated for the project. [SF/UN]

430. A loan of \$4 million was made for the first stage of an electrification programme for the Central Provinces under which the number of towns and villages served will be increased from forty-three to 118. Included in the project is the construction of a 4,000-kilowatt hydroelectric plant which will use water diverted from the San Juan River into La Yeguada Lake and from there conveyed through tunnels to the man-made El Flor Lake. [IBRD]

431. Advisory services were given on the drafting of legislation for the establishment of water and sewerage boards. [PAHO/WHO]

432. Two hundred and seventy-nine wells were dug as part of a rural water supply programme. [PAHO/WHO/UNICEF]

433. A short-term consultant on water rates, another on ground water, and advice from headquarters staff was given, two fellowships awarded and a loan from the Inter-American Development Bank obtained for the construction of water supply systems in the interior of the country. The present water-rate structure was reviewed and a central water authority created. [PAHO/WHO]

434. The services of an expert were provided to study and advise on the five-year hydrometeorological development plan formulated by the Government which envisages a thorough study of the water resources of the country. [WMO]

Paraguay

435. An expert was assigned general manager of the Corpusana water plant. [OPEX]

436. Advisory services were given on the drafting of legislation for the establishment of water and sewerage boards, and in the development of a public water supply programme. [PAHO/WHO/UNICEF]

437. Short-term consultant services were provided to accelerate well-drilling operation of projects. [PAHO/WHO]

Peru

438. A hydrogeologist is giving advice to the Government on ground-water exploration problems. [BTAO/UNRTD]

439. Equipment was procured and expert advice rendered for the installation and operation of a hydraulic laboratory, in a Special Fund project otherwise executed by WMO. [SF/WMO/UN]

440. A water desalination expert on short mission. [UNRTD]

441. The joint group of water resources experts assigned to the Latin American region started the country water resources survey. [ECLA/BTAO/WMO]

442. The project for irrigation in the Pampas de Olmos became operational in July 1963. Engineering feasibility and economic justification of a trans-mountain diversion project are being studied. [SF/FAO]

443. A loan of \$15 million was made for the second stage of a programme to expand the supply of electricity in the Greater Lima area and for an associated scheme for the use of water resources. The first stage, which was assisted by an earlier IBRD loan of \$24 million, included the 120,000-kilowatt Huinco hydroelectric power plant on the Santa Eulalia River and the Marcapomacocha water diversion scheme to collect water from the Marcapomacocha Basin and a six-mile diversion tunnel through the Andes mountains to bring waters to the Santa Eulalia basin on the western side. In the second stage, the Huinco power plant will be brought to its full capacity of 240,000 kilowatts, and additional dams and canals will be built to divert the natural outflow of six lakes to the trans-Andean tunnel. The additional water thus made available will greatly increase the generation in hydroelectric plants serving Lima, increase the city's drinking water supply, and make possible the irrigation of some 12,000 acres of arid land south of Lima. [IBRD]

444. Consultant services were provided on advisory techniques for the preparation of new projects for water supplies or for the expansion of existing ones and in the training of professional and auxiliary personnel. [PAHO/WHO]

445. A consultant in administration and one in accounting were provided to advise on the administration of the sanitary corporation of Arequipa and the creation of a similar corporation for Lima, as well as a national programme of works. Three fellowships for study in the United States were granted, and assistance given in formulating a loan application to the Inter-American Development Bank for rural water supplies. [PAHO/WHO]

Trinidad and Tobago

446. Advisory services were given on the drafting of legislation for the establishment of water and sewerage boards, and in particular the setting up of a central water authority for the two islands. [PAHO/WHO]

447. Short-term consultant services on sewerage and water supplies were provided and studies made of water pollution problems. [PAHO/WHO]

448. A short-term consultant assisted in the preparation of a Special Fund project for the determination of the country's water resources, and planning of improved utilization of these. A similar project for Tobago is being studied. [WHO/PAHO]

Venezuela

449. A water desalination expert on short mission. [UNRWD]

450. The project for an agricultural survey of selected watersheds in the north-west of the country became operational on 13 August 1962. [SF/FAO]

451. A loan of \$85 million was made for the construction of the first stage of the Guri hydroelectric power project on the Caroni River, the chief tributary of the Orinoco and one of Venezuela's most important sources of hydroelectric power. The first stage includes a dam 100 metres high, a power plant with an initial capacity of 350,000 kilowatts, and a 50-mile transmission line. The capacity of the plant could be expanded to 1,750,000 kilowatts by the installation of additional units without further increase in the height of the dam. Experts believe that the ultimate potential of the Guri site may be as much as 6 million kilowatts. [IBRD]

452. Assistance was provided to the Government in the preparation of a Special Fund request concerning the strengthening of the civil engineering faculty in four universities by introducing sanitary engineering education. [PAHO/WHO]

453. Short-term consultant services on sewerage and water supplies were provided. [PAHO/WHO]

454. Water supply services are being installed in 493 communities in the States of Trujillo, Mérida, Tachira and Zulia as part of a nation-wide drive to provide water to all small towns and rural communities with a population of over 500. Well drilling equipment is provided, storage tanks are being built, engineering advisers services are provided and some seventy-five systems per annum are being completed. [UNICEF/WHO]

455. Advice was given on community water supply programmes covering ninety systems, including the reorganization of the management of Caracas city supply, by five short-term consultants and headquarters staff, also assistance given in obtaining loans from the Inter-American Development Bank for construction purposes and in the review of water rates structure. [PAHO/WHO]

456. Two short-term consultants and headquarters staff were provided to advise on the reorganization of the central water authority and on the introduction of commercial methods of financing new projects and extending existing ones. Assistance was given in the preparation of plans for water supplies to Maracarto and other cities, and in the formulation of loan application. [PAHO/WHO]

Virgin Islands (United States)

457. A water desalination expert on short mission. [UNRFD]

Virgin Islands (United Kingdom)

458. A water desalination expert on short mission. [UNRFD]

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